

2014

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**JANUARY 9-11, 2014**

**NANYANG TECHNOLOGICAL  
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ECONOMICS SOCIETY (EBES) CONFERENCE -  
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## **EBES**

### **Eurasia Business and Economics Society**

*Eurasia Business and Economics Society (EBES)* is a scholarly association for scholars involved in the practice and study of economics, finance, and business worldwide. EBES was founded in 2008 with the purpose of not only promoting academic research in the field of business and economics, but also encouraging the intellectual development of scholars. In spite of the term “Eurasia”, the scope should be understood in its broadest term as having a global emphasis.

EBES aims to bring worldwide researchers and professionals together through organizing conferences and publishing academic journals and increase economics, finance, and business knowledge through academic discussions. To reach its goal, EBES benefits from its advisory board which consists of well known academicians from all around the world. Last year, with the inclusion of new members, our advisory board became more diverse and influential. I would like to thank them for their support.

EBES conferences and journals are open to all economics, finance, and business scholars and professionals around the world. Any scholar or professional interested in economics, finance, and business around the world is welcome to attend EBES conferences. Starting from 2012, EBES organizes three conferences every year: One in Istanbul (possibly in the early summer) and two in Europe or Asia (possibly in January and in fall).

In 2011, EBES began publishing two academic journals. One of those journals, *Eurasian Business Review - EBR*, is in the fields of industry and business, and the other one, *Eurasian Economic Review - EER*, is in the fields of economics and finance. Both journals are published bi-annually in Spring and Fall and we are committed to having both journals included in SSCI as soon as possible. Both journals are currently indexed in the *Cabell's Directory*, *Ulrich's Periodicals Directory*, *IBSS: International Bibliography of the Social Sciences*, *RePEc*, *EBSCO Business Source Complete*, *ProQuest ABI/Inform*, and *EconLit*. EBES also publishes *the EBES Anthology* annually to give opportunity for the papers presented at the EBES conferences.

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## Preface

We are excited to organize our 12th conference on January 9<sup>th</sup>, 10<sup>th</sup>, and 11<sup>th</sup>, 2014 at *Nanyang Technological University, School of Humanities and Social Sciences*, in Singapore. We are honored to have received top-tier papers from distinguished scholars from all over the world. We regret that we were unable to accept more papers than we have. In the conference, 221 papers were presented and 400 colleagues from 53 countries attended the conference.

This conference proceeding includes selected full papers from the 12th EBES Conference – Singapore. In this proceedings, you will find a snapshot of topics that were presented in the conference. As expected, our conference has been an intellectual hub for academic discussion for our colleagues in the areas of economics, finance, and business. Participants found an excellent opportunity for presenting new research, exchanging information and discussing current issues. We believe that this conference proceeding and our future conferences will improve further the development of knowledge in these fields.

Minister *Grace Fu* (Singapore), Member of the Policy Board of Bank of Japan *Sayuri Shirai*, ambassadors *Joergen Oerstroem Moeller* and *Lam Chuan-Leong*, and distinguished researchers **Euston Quah**, **A. Vedat Akgiray**, and **Yew-Kwang Ng** joined the conference as invited speakers. We organized a special session on "**Global Economic and Financial Challenges**" on the first day of the conference.

I would like to thank to the **Nanyang Technological University**, all presenters, participants, board members, and keynote speakers and we are looking forward to seeing you all again at the upcoming EBES conferences.

Best regards,

**Ender Demir, PhD**  
**Conference Coordinator**

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# BIRTH OF A NEW EMERGING DEBT MARKET, THE SUKUK MARKET

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**Abstract:** This paper reviews a new debt market instrument, first by identifying its growth over 12 years and its geographical expansion; then, comparing with conventional bond instruments (*i.e.* bonds); finally, investigating its intrinsic payoff and valuation features. The outstanding value in listed markets - excluding the OTC deals - is estimated to be US\$ 1,200 billion in 2013. The growth has accelerated to 42 per cent over 20011 and 2013, especially after firms and institutions (for example, the World bank) started to tap this new debt funding source, which is based on *risk-and-profit-sharing debenture terms*. Exchange trading is now available in 14 countries while England is making changes to her law to permit public trading of *Sukuk* bonds in London. Using paired sample tests and Granger (1969) causality tests, evidence is found to show that *Sukuk* yields are significantly *higher* than bond yields for identical risk, term and issuer: also bond yields do not Granger cause yields in this new debt market. The paper maps the payoff structure of new debt instruments, and identifies basic valuation approaches to price the new debt instruments. Our findings add significant new insights on *Sukuk*.

**Keywords:** *Sukuk*, Bond, Yield Curve, Yield to Maturity, Islamic Finance, Emerging Markets, Fixed Income Finance, Securitization, Yield Spread

## 1. INTRODUCTION

### 1.1. A Fast growing new debt market

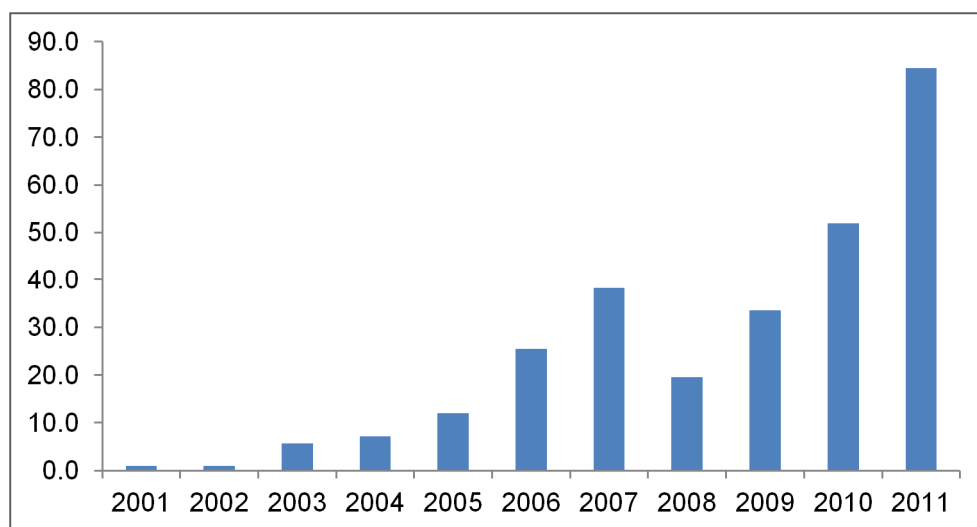
*Sukuk* market is one of the fastest growing financial markets in the world. It started in 1991 with a very humble public issuance of US\$ 30 million (RM 125 million) in Malaysia. By 2011, it reached an aggregate market size of US\$ 850 billion in 11 financial markets worldwide. This is without taking into account the private issues in the OTC markets made in major centers (Zurich, London, Frankfurt, Singapore, etc.). The *Sukuk* market has grown rapidly in the last three years, growing at 42 per cent over 2011 and 2013. This happened after the World Bank and some major Western firms raised funds at very favorable cost in Europe through private *sukuk* issuances in the OTC markets. IMF too signaled that *sukuk* is potentially the way to fund development financing in emerging economies simply because *sukuk* in developing countries such as the OIC countries will be held mostly in local currency, thus helping to eliminate currency risk that plagues development funding raised in foreign currencies.

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*Sukuk* debt is one of several new participatory (Islamic) financing modes. There are about 250 *takaful* (participatory insurance) companies, 350 Islamic equity funds, and 370 Islamic banks worldwide. The demand for *Sukuk* partly arises from these other modes of financing along with demands from major firms and governments. Since *takaful* insurance for example requires premiums to be invested in non-interest-paying debt instruments, demand for this new debt instrument is likely to also come from the requirement of *takaful* firms to invest in this new form of debt. The chief attraction is another factor: demand comes from enterprises seeking to source investors who are willing to *jointly undertake business risk* to provide higher returns to participatory financiers. Also major firms and financial institutions are turning to this new form of debt funding as suitable for entrepreneurs and financier jointly taking the business risk of enterprises, so as to make both stick out the investment risk together over time and thus provide higher yields.

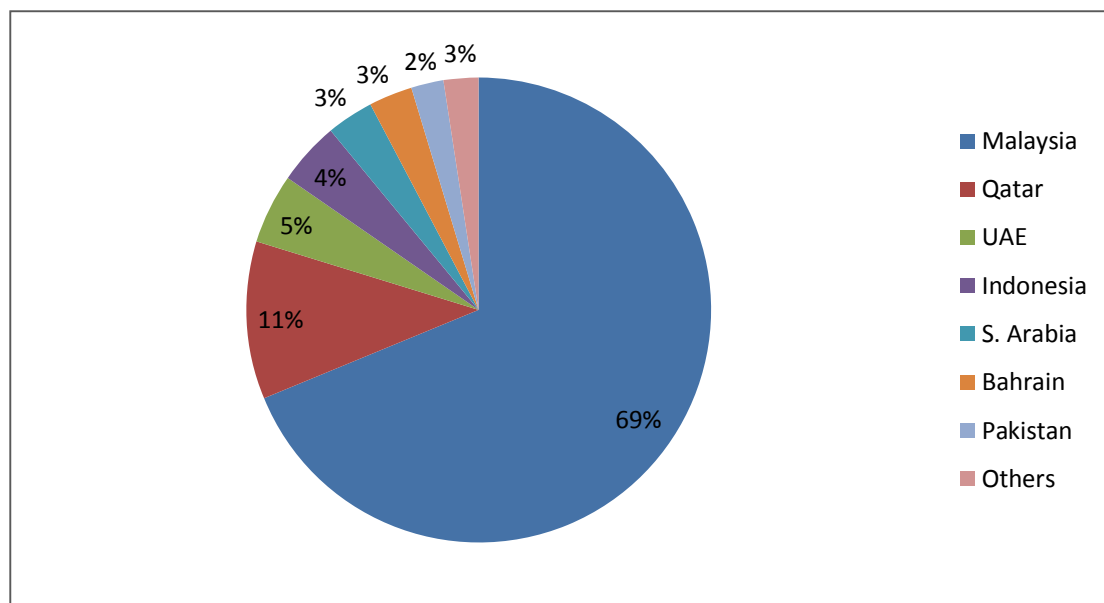
Khan and Bhatti (2008) highlighted that *Sukuk* constitute about 85 per cent of the Middle Eastern capital market, US\$ 13 billion of them have been issued there with an average growth rate of over 45 per cent during 2002-7 in that region. The Middle East and Asian regions will primarily rely on *Sukuk* to meet their US\$ 1.5 trillion infrastructure needs over the next ten years is the kind of statements one reads in commentaries (John, 2007). There are plans afoot to introduce *sukuk* trading in the Eurasian countries: even South Korea and Hong Kong have advanced plans to issue these instruments in 2014. McKenzie (2008) investigated the *Sukuk* market statistics and reported that sovereign *Sukuk* issues by Bahrain and Malaysia played an initial role in establishing the market. About 80 per cent of issues between 2001 and 2006 have been corporate issues as firms find a purpose-build contracting with financiers willing to fund on risk-and-profit shared terms. The amount of new *Sukuk* issues in last ten years is shown in plots in Figure 1.

In addition to that, he found that the most important market for corporate *Sukuk* issues totaling some US\$44 billion over 2001-6 has been for infrastructure finance, with issuance of US\$ 17 billion, 39 per cent of the total. The next largest share of the market is held by financial services (18 per cent) followed by energy sector (6 per cent). McKenzie (2009) claims that there is a growing appetite for investment in *Sukuk* that goes well beyond Islamic investors to those investors wishing to gain exposure to diversify to other high quality assets. The IFSL (2012) reported that the *Sukuk* issuance has increased significantly in the past three years beyond the USD 84.4 billion in 2011. Figure 2 illustrates the share different countries in global *Sukuk* market.



**Figure 1: Amount of worldwide *Sukuk* issues**

Source: IFSL, Zawya *Sukuk* Monitor, 2012



**Figure 2: Sukuk issuance by country, 2011**

Source: IFSL, Zawya Sukuk Monitor, 2012

### 1.2. Market size

According to International Islamic Financial Market (IIFM) 2010 report and financial press reports suggest a much higher asset value by including privately-issued *Sukuk* in a number major financial centers such as Switzerland, London, Frankfurt, Singapore and others. Hence, a figure of US\$ 840 billion is suggested in Ariff *et al.* (2012) as the market size in 2011. Since then there have been bumper issues in 2012 and 2013, which indicates that the total asset in this new emerging market is USD 1,200 billion. Currently, *Sukuk* instruments are offered in specialized exchanges such as the Labuan Exchange in Malaysia, the Third market in Vienna, the Dubai International Finance Exchange, and the London Stock Exchange (Asad, 2009b). Governments and regulators in a variety of countries have recognized the important role that *Sukuk* can play in capital markets and have been giving priority to developing their countries as *Sukuk* centers (Abd Razak and Abdul Karim, 2008).

### 1.3. What is *Sukuk* debt?

*Sukuk* is the plural form of *sakk*, which in Arabic means *legal instrument, deed, or cheque*.<sup>1</sup> It was used in pre-Islamic era before 620 AD as withdrawal certificate (a form of cheque) on deposits in financial firms or authorized merchants in the Mediterranean region. Later, these certificates became instrument for trading. And then it became debt instruments traded among willing holders of already issued debt just as is a conventional bond. Its use appear to have been swept away when the Western banking (armed with interest rate funding and fractional reserve banking) spread across the world while the Islamic empires were one by one defeated by colonizers.

Being a relatively new product in the 21-st century, there is no consensus on the exact definition of *Sukuk*. Some of international regulatory bodies such as AAOIFI, IIFM, and IFSB, attempted to define *Sukuk*. Accounting and Auditing Organization for Islamic Financial

<sup>1</sup> During the 3<sup>rd</sup> century AD, financial firms in Persia (currently known as Iran) and other territories in the Persian *Sassanid* Dynasty issued letters of credit known as "*chak*" (Kharazmi, 1895). In post-Islamic Arabic documents this word has transformed into "*sakk*" (Floor, 1990).

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Institutions (AAOIFI, 2004, p.307) defines *Sukuk* as “*Certificates of equal value representing, after closing subscription, receipt of the value of the certificates and putting it to use as planned, common title to shares and rights in tangible assets, usufructs and services, or equity of a given project or equity of a special investment activity*”.

International Islamic Financial Market (IIFM) defined *Sukuk* as a commercial paper that provides an investor with ownership in an underlying asset (Alvi *et al.* 2010). It is asset-backed trust certificates evidencing ownership of an asset or its usufruct (earnings or fruits). It has a stable income and complies with the principle of *Shariah*. Unlike conventional bonds, *Sukuk* needs to have an underlying tangible asset transaction either in ownership or in a master lease agreement. Islamic Financial Services Board (IFSB, 2009, p.3) definition of *Sukuk* is “*Sukuk (plural of sakk), frequently referred to as “Islamic bonds”, are certificates with each sakk representing a proportional undivided ownership right in tangible assets, or a pool of predominantly tangible assets, or a business venture (such as a Mudarabah). These assets may be in a specific project or investment activity in accordance with Shariah rules and principles*”.

### 1.4. Regulating *Sukuk* markets

All Islamic financial and banking interactions, similar to their conventional counterparts, are subject to regulations of professional authorities. Moreover, in order to be recognized as an risk-and-profit-shared Islamic transaction, *Sukuk* products must follow some extra procedures required by Islamic authorities (Iqbal, 1999). *Shariah* – the Islamic law - regulations governing *Sukuk*, similar to other Islamic finance and banking practices in general, are controlled by three sources; international organizations, local authorities, or in-house *Shariah* boards. Some major Islamic financial institutions have their own in-house *Shariah* Supervisory Boards (SSB). This is mostly practiced among Islamic investment companies and banks.

According to Liquidity Management Center of Bahrain (2008) In the process of issuing *Sukuk*, the *Shariah* advisors should study a proposed *Sukuk* structure and suggest a *Shariah* structure which fulfills the set economic aims sought in the issue. This is unique: unlike lending for common purpose, *sukuk* funding is contracted for specific funding needs of an entity. They work closely with legal counsel of the issuer and the arranger (investment banker) to ensure that the legal documents are in line with *Shariah* requirements. Finally, the supervisor issues an opinion (a *fatwa*) as to the compliance of the *Sukuk* with Islamic financing principles – similar to the opinion tax authorities provide on a tax question. On the whole *Sukuk* has to pass this test before it can be put into circulation. Islamic financial institutions are subject to rules and regulations of the local *Shariah* authority. Some countries such as Malaysia have set up their own *Shariah* Advisory Council (SAC) at the national level, which oversees the consistent application across similar situations in financial interactions. These councils are part of the Securities Commission or also part of the Central Bank of the country at national level. At the international level (the Organization of Islamic Countries) there is a *Shariah* Council in Saudi Arabia. Commentators have lauded these gatekeepers as promoting good governance at the firm level because the supervisors are at that level on a continuous basis, unlike in the bond markets.

In a global perspective, there are few international organizations that attempt to regulate and screen the conduct of *Sukuk* issuance and trade. Among these international organizations, AAOIFI, IFSB, and IIFM are the most influential ones (DIFC, 2009). Although these organizations try to base their rulings on *Shariah* principles, there are occasions that *Sukuk* based on their guidelines have variations in formation. Not being national bodies, these rules cannot be imposed, so remain voluntary unlike such bodies as Basle, which has some enforcement power.



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Therefore, Siddiqui (2008) highlighted that more communication between these organizations will bridge the differences existing between *Sukuk* contracts. The decisions regarding permissibility of each *Sukuk* contract, as mentioned above, is made by expert scholars trained in Islamic laws, and they are appointed to the *Shariah* Board. There some 200 such experts worldwide (Asad, 2009a). This indicates the urgent need for training of expert scholars to sit on *Shariah* boards in Islamic financial institutions. In order to address this shortfall, some Islamic institutes such as ISRA<sup>2</sup> and INCEIF<sup>3</sup> are planning to design special programs for training certified *Shariah* scholars. However, there are some other institutions that are currently providing short time courses on this topic.<sup>4</sup>

### 1.5. Credit rating of *Sukuk* debt

Credit Rating is an evaluation of a corporate or municipal bond's relative safety from an investment standpoint. In conventional sense, it scrutinizes the issuer's ability to repay principal and make interest payments. Then, a grade (the most controversial part of rating process) is given to the bond that indicates its credit quality. Private independent international rating companies such as Standard and Poor's, Moody's, and Fitch, or domestic rating agencies like RAM and MARC of Malaysia, provide these evaluations of issuer's financial strength, or the ability to pay a bond's principal and interest in a timely fashion. As a result, bonds are rated in a range from AAA or Aaa (the highest), to C or D, which represents a company that has already defaulted. Each rating company has its own definition and methodology for rating and own set of rating ranges. The introduction of *Sukuk* rating in 90's represents another critical milestone in the development of *Sukuk* market. Bond ratings are principally designed to arrive at a reasoned judgment on credit risk via a careful analysis of the critical issues surrounding a specific debt on the issuer (Mohd Asri, 2004).

From the global capital markets point of view, *Sukuk* can be rated just like any conventional bond, and can be traded as such, as well (Maurer, 2010). In general, rating agencies have the same criteria for corporate bonds rating. The criteria incorporate issue structure (repayment schedule and debt types), business risk analysis, financial risk analysis, management, ownership and other qualitative factors (Mohd Asri, 2004). However, realizing the uniqueness and types of *Sukuk*, the rating methodology should be different to that of conventional bonds rating (Jalil, 2005). Rosly (2007) argued that *Sukuk* structures falls in 2 categories:

- Asset-Backed *Sukuk*, for which ratings are dependent on a risk analysis of the asset. However, investors hold rights to underlying assets through SPV and not directly; hence, *Sukuk* performance is driven by assets and not linked to the originator.
- Unsecured *Sukuk*, for which ratings are primarily dependent on the riskiness of the sponsor, originator, or the borrower.

Therefore, similar to conventional bonds, risk elements affecting *Sukuk* should be thoroughly investigated by rating agencies. Among risk elements, Rosly (2007) mentioned that credit risk is the most critical one. Other factors he highlighted are currency risk (for international issues), tax risk, and reserve funds. In contrast to highly sensitive conventional bonds, *Sukuk* are less sensitive to interest rate. Zurich based investment bank Credit Suisse believes investment in Islamic Finance and Banking products are not expose to interest rates since Islam prohibits charging interest and *Sukuk* securities are unaffected to the credit crisis in the international finance and banking industry (Farook, 2009). Tariq (2004) summarized risk characteristics of each type of *Sukuk* structures which is depicted in Table 1.

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<sup>2</sup> International *Shariah* Research Academy for Islamic Finance, based in Kuala Lumpur, Malaysia.

<sup>3</sup> International Centre for Education in Islamic Finance, based in Kuala Lumpur, Malaysia.

<sup>4</sup> Besides the ISRA and INCEIF which offer long term programs, we can mention, among all, Dr. Kahf Institute, REDmoney Islamic Finance training institute, and UK Islamic Finance Council.

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**Table 1: Summary of risk characteristics of *Sukuk* structures**

Type of <i>Sukuk</i>	Description of <i>Sukuk</i> structure	Credit Risk	Rate of return (Interest rate risk)	FX risk	Price risk	Other risks
Zero coupon <i>Sukuk</i>	<i>Istisna</i> , <i>Murabahah</i> debt certificates – non-tradable	Unique basis of credit risks exist, (Khan and Ahmed, 2001)	Very high due to fixed rate, remains for the entire maturity of the issue	If all other conditions are similar, FX risk will be the same for all cases of <i>Sukuk</i> .	Related to the underlying commodities prices and assets in relation to the market prices. <i>Ijarah Sukuk</i> is most exposed to this as the values of the underlying assets may depreciate faster as compared to market prices.	<b>Liquidity Risk</b> is serious as far as the non-tradable <i>Sukuk</i> are concerned. <b>Business risk</b> of the issuer is a risk underlying <i>Sukuk</i> as compared to traditional fixed incomes. <b>Shariah compliance risk</b> is another one unique in case of <i>Sukuk</i> . <b>Infrastructure rigidities</b> , lack of efficient institutional support increases the risk of <i>Sukuk</i> as compared to traditional fixed incomes, (Sundararajan and Errico, 2002)
Fixed Rate <i>Ijarah Sukuk</i>	Securitized <i>Ijarah</i> certificate holder owns part of asset or usufructs and earns fixed rent - tradable	Default on rent payment, fixed rate makes credit risk more serious	Very high due to fixed rate, remains for the entire maturity of the issue	However, those <i>Sukuk</i> which are liquid or which are relatively short term in nature will be less exposed. The composition of assets in the pool will also contribute to the FX risk in different ways. Hence this can be very useful tool to overcome the FX risk by diversifying the pool in different currencies.	Maintenance of the assets will play an important part in this process. Liquidity of the <i>Sukuk</i> will also play an important part in the risk. <i>Salam</i> is also exposed to price risks. However, through parallel contracts these risks can be overcome	
Floating Rate <i>Ijarah Sukuk</i>	Certificate holder owns part of asset or usufructs and earns floating rent indexed to market benchmark such as LIBOR – tradable	Default on rent payment, floating rate makes default risk lesser – serious – see previous case	Exists only within the time of the floating period normally 6 months			
Fixed rate Hybrid/ Pooled <i>Sukuk</i>	Securitized pool of assets; debts must not be more than 49%, floating rate possibility exists – tradable	Credit risk of debt part of pool, default on rents, fixed rate makes credit risk serious	Very high due to fixed rate, remains for the entire maturity of the issue			
<i>Musharakah</i> Term Finance <i>Sukuk</i> (MTFS)	Medium term redeemable <i>Musharakah</i> certificate based on diminishing <i>Musharakah</i> – tradable as well as redeemable	<i>Musharakah</i> has high default risk (Khan and Ahmed, 2001). MTFS could be based on the strength of the entire balance sheet	Similar to floating rate, but, unique because the rate is not indexed with a benchmark like LIBOR, hence least exposed to this risk			
<i>Salam Sukuk</i>	Securitized <i>salam</i> , fixed-rate and non-tradable	Unique credit risk (Khan and Ahmed, 2001)	Very high due to fixed rate			

Source: (Tariq, 2004)

## 2. SUKUK YIELDS ARE DIFFERENT FROM BOND YIELDS

This section provides empirical evidences that *Sukuk* securities are different from conventional bonds because the pricing of any one of the six *sukuk* instruments is based on different economic principles. First, it is a contracting to share in the financing an enterprise to share in the risk of the business and sharing the profits and loss. Second, the borrower loses control of part of his assets that are taken over by the lender till the term of the contract. We proceed to test if the asymmetric contracting to share risk and profits would mean a higher yield than would be the case for identical bonds; second, the asset transfer to

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lender would make this form of borrowing more risky. Hence, a priori we expect the yields of *sukuk* to be higher than that of bonds: we test for statistically different yields of the pairs of *Sukuk* and bonds issued by same issuer and for the same maturity period; and third we use Granger causality test to see if there is causal relation between bonds and *sukuk*. Tests were conducted using data on aggregated monthly yield to maturity (YTM) data<sup>5</sup> from Malaysian securities over August 2005 to April 2013 (total of 93 observations for each security).

### 2.1. Descriptive statistics

Descriptive statistics of various *Sukuk* securities and conventional bonds are presented in Table 2. The statistics suggest that the mean yield of *Sukuk* securities for all types of issuers and for all forms of maturities is 3.92 per cent. The yields vary within a minimum of 2.91 (3-month Treasury *Sukuk*) and a maximum of 5.66 (*Sukuk* securities issued by AAA rated corporations with 20-year maturity). On the other hand, the mean yield of conventional bonds of all types of issuers and all maturities is 3.91 per cent. These vary between a minimum of 2.90 (3 months maturity Treasury bills) and the maximum of 5.60 (conventional bonds issued for AAA rated corporates with 20-year maturity). At the issuer level, AAA rated corporate *Sukuk* securities yielded 4.29 per cent while the mean of Treasury bill yields is 3.55 per cent. On the other hand, the highest conventional mean yield for AAA rated corporate issuers is 4.31 per cent while the lowest mean yield for conventional bills and notes issued is by the Government of Malaysia with 3.51 per cent.

### 2.2. Yield curves

The yields are plotted in Figure 3. The yield curve is the relation between the cost of borrowing and the time to maturity of a debt security for a given issuer for a given rated quality. Yield curves for *Sukuk* securities and conventional bonds issued by government and corporations are plotted as in Figure 3A and Figure 3B. The plots are presented as YTM of (i) conventional against (ii) *Sukuk* issues in two plots. The two issuer types are of increasingly higher risk rating with sovereign being 0 the lowest risk – therefore with the lowest yields – on the one end, and the AAA corporate issues with higher yield at the other end.

As Figure 3(A) suggests, the yields of Government Islamic Issues (GII) are higher than those of conventional bonds issued by the same issuer (Malaysian Government Securities, or MGS). The difference between *Sukuk* yield and conventional bond yield is larger as maturities increase from 2 years to 15 years. The maximum difference between the yields of *Sukuk* securities and those of conventional bonds for this category is with 3 years maturities. The difference is 8.28 basis points. On average, there is a 4.04 basis points difference between yields of *Sukuk* securities and conventional bonds. The total outstanding value of *Sukuk* securities issued by Malaysian government as at April 2013 was RM 155.9 billion (US\$ 55 billion). Multiplying yield difference and market size indicates that the investors pay an extra US\$ 1.5 billion (RM 4.7 billion) per year to investors holding *Sukuk* securities compared to the amount paid to conventional bond investors of same term and quality. This means that the *Sukuk* investors earn RM 4.7 billion higher return compared to the investors in conventional bond market. Obviously *Sukuk* yields are systematically higher. Obviously *sukuk* with attractive funding terms does have higher risk associated, for which the higher yields are considered acceptable by borrowers.

The pattern in Figure 3(B) shows the yields of securities issued by AAA rated corporate issuers. Yields are *less* than yields of conventional bonds for maturities of less than 10 years: it is *more* for periods beyond 10 years. The maximum difference between the yields of *Sukuk*

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<sup>5</sup> Data is collected from Bondstream database, a product of Bond Pricing Agency Malaysia. Sample is limited to Malaysia due to unavailability of parallel markets for *sukuk* and bonds in other countries. Moreover, Malaysia accommodate almost two third of world *sukuk* issues.

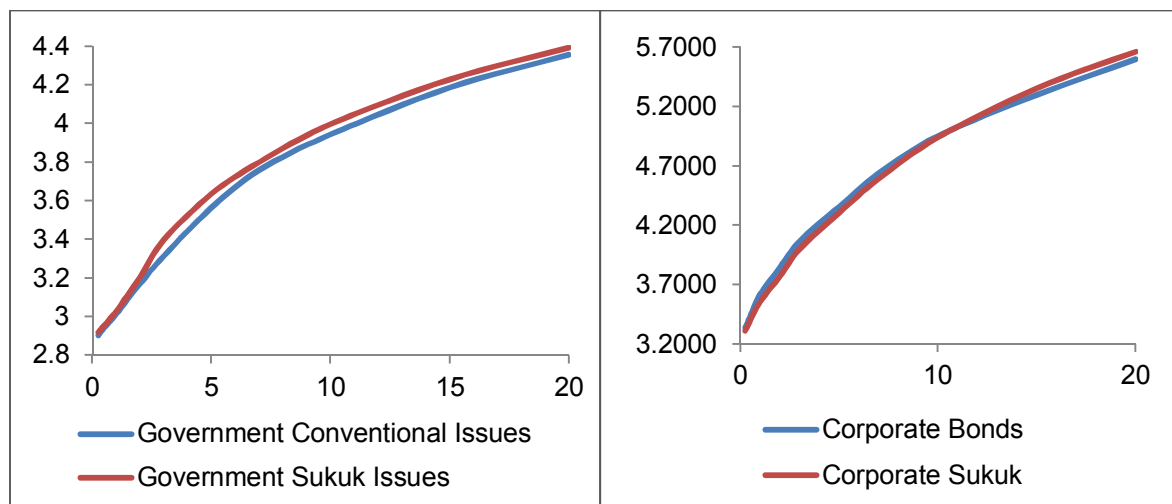
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securities and the conventional bonds issued by corporate issuers with maturities less than 10 years is for those with 2-year maturity with a -7.28 basis points. However, the maximum amount for securities with maturities longer than 10-year term is +6.38 basis points for securities with 20-year maturity. Long-dated *Sukuk* securities are perceived by the market as being more risky, thereby attracting higher yields. Long dated *Sukuk* are perhaps more risky given the risk of greater uncertainty beyond 10 years.

**Table 2: Descriptive statistics of *Sukuk* vs. Conventional bonds**

Issuer	Tenure	Mean	Median	Std. Dev	Range	Min	Max	Mean	Median	Std. Dev	Range	Min	Max
Conventional								<i>Sukuk</i>					
Government	3-Month	2.903	2.89	0.519	1.84	1.82	3.66	2.9183	2.89	0.538	1.96	1.82	3.78
	6-Month	2.942	2.92	0.527	1.98	1.85	3.83	2.9544	2.92	0.544	2.04	1.85	3.89
	1-Year	3.015	2.99	0.525	2.06	1.92	3.98	3.0280	2.99	0.530	2.11	1.97	4.08
	2-Year	3.17	3.1	0.447	2.1	2.2	4.3	3.2039	3.11	0.436	2	2.3	4.3
	3-Year	3.315	3.21	0.380	2.13	2.37	4.5	3.3976	3.31	0.340	1.84	2.63	4.47
	5-Year	3.564	3.5	0.318	1.8	2.78	4.58	3.6359	3.63	0.310	1.8	2.85	4.65
	7-Year	3.759	3.74	0.319	1.84	2.91	4.75	3.8003	3.75	0.312	1.79	3	4.79
	10-Year	3.943	3.95	0.391	1.93	3.09	5.02	3.9967	3.99	0.358	1.81	3.17	4.98
	15-Year	4.186	4.13	0.401	1.77	3.35	5.12	4.2285	4.18	0.374	1.67	3.45	5.12
	20-Year	4.357	4.3	0.393	1.58	3.6	5.18	4.3946	4.32	0.372	1.5	3.68	5.18
	Mean	3.515	3.473	0.422	1.90	2.58	4.49	3.556	3.509	0.411	1.85	2.67	4.45
Corporate	3-Month	3.3394	3.33	0.453	2.17	2.28	4.45	3.3133	3.29	0.455	2.17	2.24	4.41
	6-Month	3.4333	3.39	0.412	1.9	2.6	4.5	3.4009	3.35	0.405	1.9	2.56	4.46
	1-Year	3.6178	3.52	0.375	1.59	3.1	4.69	3.5534	3.47	0.359	1.61	3.04	4.65
	2-Year	3.8454	3.7	0.359	1.61	3.32	4.93	3.7726	3.67	0.324	1.56	3.3	4.86
	3-Year	4.0665	3.97	0.366	1.61	3.62	5.23	4.0016	3.93	0.322	1.5	3.62	5.12
	5-Year	4.3576	4.27	0.385	1.57	3.87	5.44	4.3082	4.24	0.352	1.56	3.84	5.4
	7-Year	4.6380	4.57	0.420	1.7	4.03	5.73	4.5942	4.53	0.405	1.69	4	5.69
	10-Year	4.9529	4.93	0.477	1.85	4.21	6.06	4.9433	4.93	0.483	1.84	4.18	6.02
	15-Year	5.3006	5.31	0.494	1.98	4.41	6.39	5.3559	5.3	0.580	2.15	4.38	6.53
	20-Year	5.6013	5.6	0.521	2.12	4.61	6.73	5.6651	5.66	0.573	2.11	4.58	6.69
	Mean	4.315	4.259	0.429	1.81	3.60	5.41	4.291	4.237	0.425	1.80	3.57	5.38

It is puzzle why the same firms issuing short-dated securities provide a safer investment. Obviously again, the yield differences are systematic. On average, there is a -2.44 basis points difference between yields of *Sukuk* securities and conventional bonds. The total outstanding value of *Sukuk* securities issued by Malaysian AAA Corporate issuers in April 2013 was RM 64.48 billion (US\$ 22 billion). Multiplying yield difference and the market size indicates that the AAA corporate issuers would save RM 1.57 billion (US\$ 0.53 billion) per year on their *Sukuk* securities.



**Figure 3: Yield curve for *Sukuk* securities vs. Conventional bonds**  
**A) Yield Curve of Government Issued Securities**      **B) Yield Curve of Corporate Issued Securities**

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## 2.3. Comparison of yields of *Sukuk* securities and conventional bonds

Results of the paired sample t-tests are summarized in Table 3 (panels A and B) on the equality of means. Out of the 20 tested pairs of mean yields of *Sukuk* and conventional bonds, 19 cases (95 per cent) showed significant differences in their yields to maturities. In 15 cases, the null hypotheses are rejected at 0.01 significance levels. Thus, the yields of *Sukuk* securities differ from those of conventional bonds, although the issuer and the issue tenure are the same. Summary statistics are in Table 3A. We use the simple parametric mean difference tests to see if the yields of matched samples of *sukuk* and bonds are the same. As the t-statistics computed on mean differences suggest, the mean yield of *Sukuk* securities and conventional bonds are significantly different in all issues by Government. The difference between the means of these is positive, indicating that *Sukuk* securities tend to yield more than conventional bonds issued. Thus, the market associates higher risks to *Sukuk* structures rather than conventional structures.

Table 3B is a summary of the statistics for *Sukuk* securities and conventional bonds issued by AAA rated corporations. The mean yields of *Sukuk* securities and conventional bonds are significantly different in all cases except in the cases of 10-year maturity. The differences are negative for securities with tenure 7 year or less, while, for securities with 10 years maturity or more, the difference is positive. This means the mean of yield of *Sukuk* securities issued by AAA rated corporations is lower than the yield of conventional bonds for issues with 7 years or less maturity: a cost advantage. For the securities with long term maturities (10 years and more) the mean yield of *Sukuk* securities is higher than the conventional bonds: risk appears to be higher.

**Table 3A: Paired samples t-test results: Government**

Tenure	<i>Sukuk</i>	Conv	$\Delta$ ( <i>Sukuk</i> -Conv)	t-Stat
Government				
3M	2.9183	2.9031	0.0152	2.789***
6M	2.9544	2.9424	0.0120	2.461**
1Y	3.0280	3.0147	0.0132	2.419**
2Y	3.2039	3.1699	0.0340	4.789***
3Y	3.3976	3.3148	0.0828	7.686***
5Y	3.6359	3.5641	0.0718	8.465***
7Y	3.8003	3.7588	0.0415	6.418***
10Y	3.9967	3.9433	0.0533	7.037***
15Y	4.2285	4.1865	0.0420	5.887***
20Y	4.3946	4.3567	0.0380	5.043***

**Table 3B: Paired samples t-test results: Corporate issues**

Tenure	<i>Sukuk</i>	Conv	$\Delta$ ( <i>Sukuk</i> -Conv)	t-Stat
3M	3.3133	3.3394	-0.0260	-6.173***
6M	3.4009	3.4333	-0.0325	-7.483***
1Y	3.5534	3.6178	-0.0644	-7.360***
2Y	3.7726	3.8454	-0.0728	-6.789***
3Y	4.0016	4.0665	-0.0648	-6.047***
5Y	4.3082	4.3576	-0.0495	-5.685***
7Y	4.5942	4.6380	-0.0438	-7.318***
10Y	4.9433	4.9529	-0.0096	-0.953
15Y	5.3559	5.3006	0.0553	2.414**
20Y	5.6651	5.6013	0.0638	2.571**

Note: \*\*, \*\*\*: significant at 0.05, and 0.01 significance levels, respectively.

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### 2.4. Granger causality test of yields of *Sukuk* and conventional bonds

The previous section showed that the mean yield of *Sukuk* is statistically different from mean yield of conventional bonds. Since each pair of securities issued by the same issuer for the same period of time and for same rating, it is expected that the correlation between yields of these securities may be high. This may be a valid reason for a hypothetical argument that this difference arises from an unidentified causal relationship. One may wish to test if changes in yield of one type of security may actually cause change in the other series? In other words, one may want to test for Granger Causality (Granger, 1969) between yields of *Sukuk* securities and those of conventional bonds to identify if some causal link exists between the two. After all, both securities are issues by same borrowers, and there may be a reason for interdependence.

Two Granger causality tests were conducted on each pair of securities. First test is on the change in yield of *Sukuk* to test if it causes a change in yield of conventional bonds: second test is the converse. The latter test is on the yields of conventional bonds Granger causing yields of *Sukuk*. Results of pair-wise Granger causality tests on each pair are presented in Table 4. The null hypothesis is: “yield of *Sukuk* security does not Granger-cause the yield of conventional bond yields”. The statistics in Table 3 suggest, out of 20 pairs of securities tested, the null hypothesis is rejected in 6 pairs at the 0.10 significance level: yields of *Sukuk* securities Granger cause yield of conventional bonds in only 30 per cent of the pairs. This indicates that one may not generally conclude that yield of *Sukuk* securities Granger cause the yields of conventional bonds. Results also show that yields of Government *Sukuk* (1, 2, 3 and 5 years) and those of AAA rated corporate issues (1 and 2 years) Granger cause conventional bond yields. Results do not show a consistent pattern in terms of issuer or maturity of the security for having a Granger causal effect.

The second test is: “yield of conventional bonds does not Granger cause the yield of *Sukuk* security”. Out of the 20 pairs of securities tested, the null hypothesis is accepted in majority of cases (16 pairs) at the 0.05 significance level. This indicates that one may not generally conclude that the conventional bond yields Granger cause *Sukuk* security yields. These results show that yield of conventional bonds issued by Government (2 and 3 years) and AAA rated corporate (6 months and 1 year) do not Granger cause their *Sukuk* counterparts. Results do not show consistent pattern in terms of issuer or maturity of the security for having a Granger causal effect.

Finally, as shown in Table 4, bi-directional Granger causality (Enders, 1995; Hossain, 2005) between yield of *Sukuk* and yield of conventional bonds is observable in only 3 out of 20 (or 15 per cent) pairs: null accepted in 85% cases. In other words, in only 3 pairs of securities, null hypotheses are significantly rejected. This result may signal that both variables are Granger caused by a third variable yet to be identified in some cases. Results thus show that yield of *Sukuk* and conventional bonds have bi-directional Granger causal relation only in securities issued by Government (for 2 and 3 years) and AAA rated corporate (1 year): the majority of results does not support any causal relation.

In summary, it is reasonable to conclude that, with few exceptions, there is no causal relationship between *Sukuk* and conventional bonds or vice versa. This is the second statistically supported evidence to affirm an argument that the two types of debt instruments are *not the same*. This conclusion has important implication for market operation, valuation practices, risk estimation and regulatory rule setting. These are challenges to be addressed in future research.

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**Table 4: Pair-wise Granger Causality Tests with Lags = 2**

Issuer	Maturity	Sukuk security does not Granger Cause conventional bond		Conventional bond does not Granger Cause Sukuk security	
		F-Statistic	Prob	F-Statistic	Prob
Government	3M	0.190	0.8266	0.8972	0.4115
	6M	0.7611	0.4702	1.2937	0.2795
	1Y	2.5477**	0.0842	1.5399	0.2202
	2Y	3.7064**	0.0286	3.7080**	0.0285
	3Y	2.4141*	0.0955	5.1703***	0.0076
	5Y	3.6773**	0.0293	0.8004	0.4525
	7Y	0.6627	0.5180	0.0314	0.9690
	10Y	0.1797	0.8358	0.2506	0.7788
	15Y	0.1263	0.8815	0.8322	0.4325
	20Y	0.2575	0.7736	1.1982	0.3067
Corporate	3M	0.0684	0.9339	1.6904	0.1905
	6M	0.9525	0.3898	3.3457**	0.0399
	1Y	3.1337**	0.486	5.6886***	0.0048
	2Y	3.0097*	0.0545	1.6613	0.1959
	3Y	0.8961	0.4119	0.7585	0.4714
	5Y	1.0998	0.3376	0.3039	0.7387
	7Y	1.7843	0.1724	1.2941	1.2794
	10Y	0.0696	0.9327	0.7896	0.4573
	15Y	0.6228	0.5389	0.5011	0.6078
	20Y	0.9677	0.3840	0.9878	0.3766

**Note:** \*, \*\*, \*\*\*: significant at 0.10, 0.05, and 0.01 significance levels, respectively.

### 3. STRUCTURING SUKUK CONTRACT

This section reviews the structure of just three major types of *Sukuk* securities: *Ijarah*, *Musharakah*, and *Mudarabah*.

#### 3.1. Ijarah Sukuk or leases

*Ijarah*, which means “to give something on rent” (Lewis and Algaoud, 2001), is the recompense that proceeds from a rental contract between two parties, where the lessor (the owner of the asset) leases capital asset to the lessee (the user of the asset) (Gait and Worthington, 2007). There is a tendency toward lease financing (*Ijarah*) in Islamic banking sector, since it promises higher yields than in conventional trade finance (*Murabahah*). It also has longer financing horizon, which is an important feature for business investments (Daryanani, 2008).

In order to be permissible under the regulations on Sukuk, the lease contract should satisfy some conditions. The primary requirement is that the lessor must be the real owner and in possession of the asset to be leased under contract. As a result, the lessor should solely bear all risks and uncertainties associated with the asset and be responsible for all damages, repairs, insurance, and depreciation of the asset (Khan and Bhatti, 2008). It could be inferred that charging rental payment is not allowed until the lessee actually receives the possession of the asset and shall pay the rental only as long as it is in usable condition. The lessor is responsible for manufacturing defects which are beyond the lessee's control. However, the lessee is responsible for the proper upkeep and maintenance of the leased asset. The

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intention of imposing such restriction in lease contract is to protect both parties to the contract by reducing the uncertainty and ambiguity from the agreement (Wilson, 2004). In addition to that, both lessor and lessee should be clear about the purpose of *Ijarah* funding and the usage of assets. Moreover, the purpose for which the fund is raised must comply with *Shariah* (Al-Omar and Abdel-Haq, 1996).

There are two forms of leasing contracts, or *Ijarah* leasing. Direct leasing contract is the case where the lessee uses the capital asset owned by the lessor, with his/her permission, for a specific period of time for a monthly or annual rent. The owner assumes ownership title during the whole contract period, and the owner should perform the ownership responsibilities such as insurance (Zaher and Hassan, 2001). In this contract, possession of asset should be transferred back to the owner after the contract matures. In other words, in pure *Ijarah* contracts, there is no option to transfer the ownership of the asset at maturity (Safari, 2013).

*Ijarah wa Iqtina*, or hire purchase, is the case of contract where the basic intention is to transfer the ownership after the leasing period. This is a popular contract, under which the financial entity purchases equipment or some other capital asset on the request of an individual or institutional customer. The entity then rents it to the customer for a certain fixed rent. On the other hand, the customer promises to purchase the equipment or asset within a specified period to transfer the ownership from the Islamic bank to the customer (Al-Jarhi and Iqbal, 2001). However, it should be noted that the lease contract is completely separate and independent from the contract of purchase of residuals, which has to be valued on a market-basis and cannot be fixed in advance.

The contract should be an optional, non-binding contract because the quality and the market price of the asset at the end of the lease period are unclear (Chapra, 1998). One other approach is as in the case where the ownership is gradually transferred to the customer. In this case, and in addition to the regular rental payment, the customer shall pay installments of the value of the asset in order to reduce the ownership share of the lessor in the asset until the ownership is fully transferred to the lessee (Metwally, 2006). This form of contracting enjoys widespread acceptance among *Shariah* scholars, so it is widely used in real estate, retail businesses, industry, and manufacturing sectors (Iqbal, 1998; Warde, 2000).

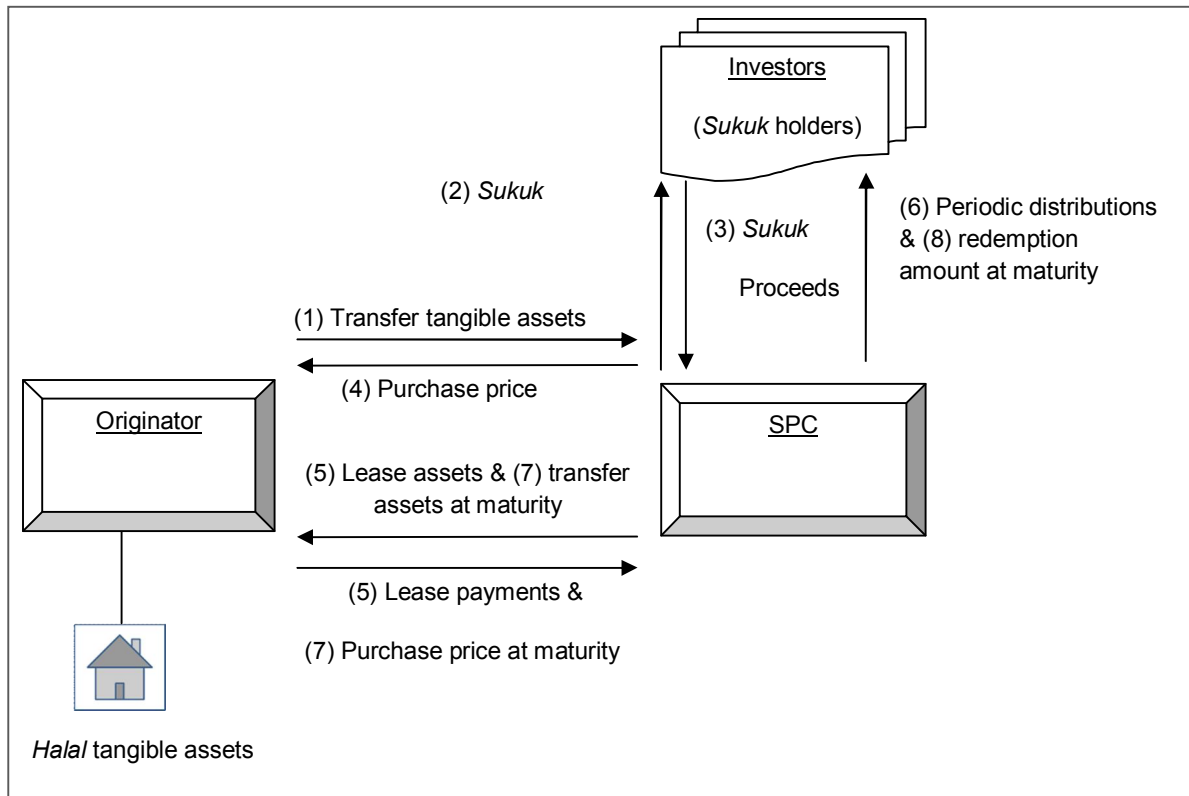
In order to issue a lease debt contract, the originator owning the assets sells the assets to a Special Purpose Vehicle (SPV), which is typically a company in an offshore tax-free site (to reduce costs). Then the SPV leases back the assets to the issuer at a specific predetermined rental fee and then the SPV securitizes the ownership in the assets by issuing the debt certificates to the public investors (Lewis, 2007). These certificates represent an undividable share in the ownership of the assets which entitle the holders a share in the distribution of the rental payments on the underlying assets. However, the rental payment could be fixed or floating for the whole period, dependent on the leasing contract term agreed between the SPV and originator. Since these certificates represent ownership in real assets, they can be traded in a secondary market.

The SPV manages the cash flows of the *Sukuk* contract by receiving periodic rentals and installments from the originator and then disbursing the cash flows to the *Sukuk*-holders (Aseambankers, 2005). SPV also manages disbursement of lump sum maturity payments. At the maturity of a *Sukuk* contract, the SPV no longer has a role and consequently will cease to exist. However, the *Ijarah Sukuk* is typically issued for periods longer than five years and could be considered as long term debt certificates. This may raise the issue of SPV's default risk, so, the investors typically receive a direct guarantee from the issuer's guarantee of the SPV obligations (Wilson, 2008). This guarantee also includes the obligation by the issuer to repurchase the asset from the SPV at the end of the *Ijarah* contract at the original sale price.



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Wilson (2008) suggests that SPV does not have any of the risks associated with banks due to SPV's nature. In other words, SPV is bankruptcy remote. If the issuer faces the bankruptcy, the creditors to the issuer cannot claim the assets held by the SPV neither could the creditors interfere with the rights of the *Sukuk*-holders with respect to the underlying assets (Gurgey and Keki, 2008). As a result, SPV would be attractive to both issuers and investors, and this may justify the relatively high legal establishment costs. Figure 4 is an example contract.



**Figure 4: *Ijarah Sukuk* structure - Adapted from Safari et al. (2014)**

Kamali (2007) claims that the fixed and predetermined nature of rental cash flow introduces additional risk because the *Sukuk*-holders receive steady income, which is less risky than is the case with common stock returns. However, he mentioned that general market conditions, price movements of real assets, ability of the lessee to pay the rental or installments, maintenance and insurance costs are sources of risks to leasing under *Sukuk*. He concluded that because of these risk factors, the expected return on some of them may not be precisely predetermined and fixed. Thus, the fixed rental may only represent a maximum that is subject to some possible reductions.

The major criticism of *Ijarah Sukuk* is that the return is variable or floating in most cases. Moreover, this variable rate, sometimes for simplification reason, is mostly benchmarked or "pegged" to an interest-based index such as the London Interbank Offered Rate (LIBOR) for US\$ based *Sukuk* and in cases of local currencies, the local interest benchmark rates. Usmani (2002) criticized this practice as associating *riba* (usury/interest charges) to this practice. *Shariah* scholars suggest the usage of other non-interest benchmarks for pricing and evaluation purposes. In order to overcome the criticism, government *Sukuk* could be benchmarked to macroeconomic indicators while corporate *Sukuk* could be assessed based on the company performance indicators.

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### 3.2. Musharakah Sukuk

Iqbal and Molyneux (2005) defined *Musharakah* or joint ownership as “an arrangement where two or more parties establish a joint commercial enterprise and all contribute capital as well as labor and management as a general rule”. In contrast to *Mudarabah* contract (loan contract), joint ownership investors have the right to participate in management of the business partnership, however, this right is entrusted to each investor (Shinsuke, 2007) in proportion to asset holding. It could be argued that *Musharakah* contract may require establishment of a partnership or company, where contracting parties are the entrepreneurs and owners (Wilson, 2004).

*Musharakah* type of equity finance demands that both a profit-sharing ratio and length of the joint venture agreement are decided in advance. Similar to other instruments, loss is shared in proportion to the capital contribution unless the loss is proven to be due to negligence of one party (Daryanani, 2008), in which case court would be asked to determine damage. Therefore, all profits and losses generated from the joint venture are shared among the parties on the basis of the pre-agreed ratio. As a result, it is basically suitable for financing private or public companies as well as projects as also practiced by Islamic banks, where it is typically performed through joint ventures between banks and business firm for a certain operation (Gait and Worthington, 2007).

Joint venture, due to its nature, provides advantages and returns equal (in proportion) for all parties. This form has the support of all jurisdictions, and is valid under *Shariah* principles. However, El-Gamal (2000) suggests that parties to this form of contract usually need the help of legal expert to ensure that any potential conflict with interest/usury or uncertainty (*Gharar*) is carefully avoided. On the discussion about these contracts, Chapra (1998, p.7) concluded that “*The only requirement of the Shariah would be justice, which would imply that the proportional shares of partners in profit must reflect the contribution made to the business by their capital, skill, time, management ability, goodwill and contacts. Anything otherwise would not only shatter one of the most important pillars of the Islamic value system, but also lead to dissatisfaction and conflict among the partners and destabilize the partnership. The losses must, however, be shared in proportion to capital contribution and the stipulation of any other proportion would be ultra vires and unenforceable.*”

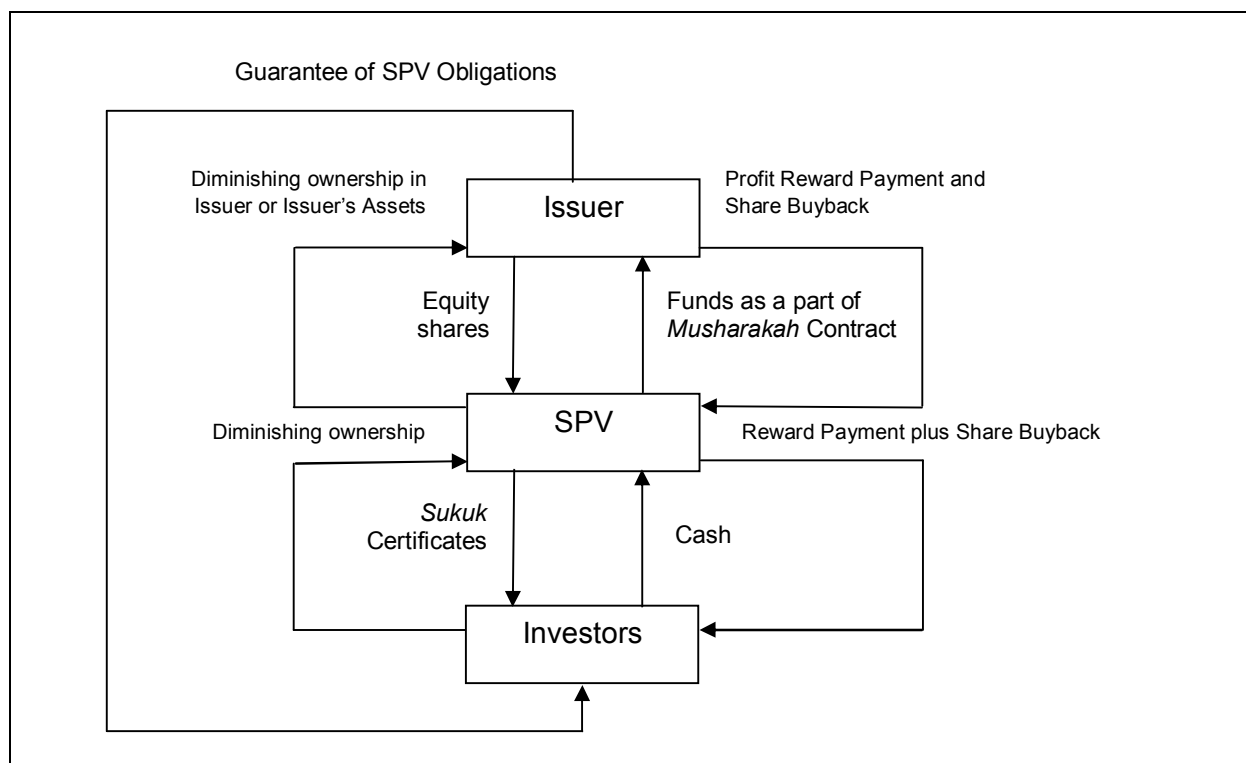
Lewis and Algaoud (2001) suggest two ways to structure such a contract. However, both types are based on the same general concept of *Musharakah*, where parties (capital owner and entrepreneur) are ensured an equitable share in the profit or loss on pre-agreed terms. The difference lies in the pre-agreed sharing ratio. In the first method, this pre-agreed ratio is pre-agreed and fixed and remains constant for the whole period of the contract. In the second type, the ratio is declining. This is the diminishing *Musharakah* contract, which is preferred by some financiers since it allows release of their capital from the investment by reducing its equity share each year and receiving periodic profits based on the remaining balance. On the other hand, the equity share of the entrepreneur increases over time to the extent that he/she becomes the sole owner of the firm. This is ideal for venture-capital type businesses. Hence this form of contract is ideal for operating venture capital financing.

*Sukuk* based on diminishing *Musharakah* are gaining favor since they enable Islamic banks or *Shariah*-compliant investment companies to provide up-front investment funding to the issuer. In this regard, both parties establish a Special Purpose Vehicle (SPV) to administer the *Sukuk*. In order to issue a diminishing *Musharakah Sukuk*, the issuer transfers the ownership of an asset to the SPV to enter the partnership agreement. The investors enter the agreement by paying cash. Therefore, both the investors and the issuer are equity partners in the SPV. However, the investors share in the SPV diminishes over time as the issuer pays installments to investors to repurchase their respective shares in the asset. These installment payments plus the issuer's rental payments for use of asset (asset's

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generated income) so the contract becomes a *Musharakah Sukuk* with cash flow stream for holders. In fixed-ratio *Musharakah Sukuk*, the cash flow stream for the holder is only from the income generated from the asset and not the installment part. The structure of diminishing *Musharakah Sukuk* is depicted in the Figure 5.

Flexibility in payment schedule and amounts have made diminishing *Musharakah Sukuk* more convenient to use. However, it should be highlighted that all arrangements should be agreed upon *ex-ante* by all parties to the SPV. The payments are usually monthly or quarterly, but not necessary in equal amounts (Wilson, 2008). Smaller installments could be made during the initial period of the *Sukuk*, with most of the asset value or SPV capital remaining with the investors, but the amount of the installment payments could increase in a linear fashion, or according to some predetermined formula. As the issuer's share in the asset increases through the buy-back process, the periodic rental might be expected to decrease due to a decline in remaining share. However, this does not necessarily have to be the case, especially if there is capital appreciation in the value of the asset. In other words, when installment and rental payments are aggregated, they might be constant, diminishing or increasing over time, provided both parties agree to the formula used and the documentation is transparent.



**Figure 5: Diminishing *Musharakah Sukuk* structure**

Source: Safari et al. (2014)

### 4. Identifying *Sukuk* cash flows

This section reviews cash flow patterns of two major types of *Sukuk* securities namely lease (*Ijarah Sukuk*) and joint venture (*Musharakah Sukuk*).

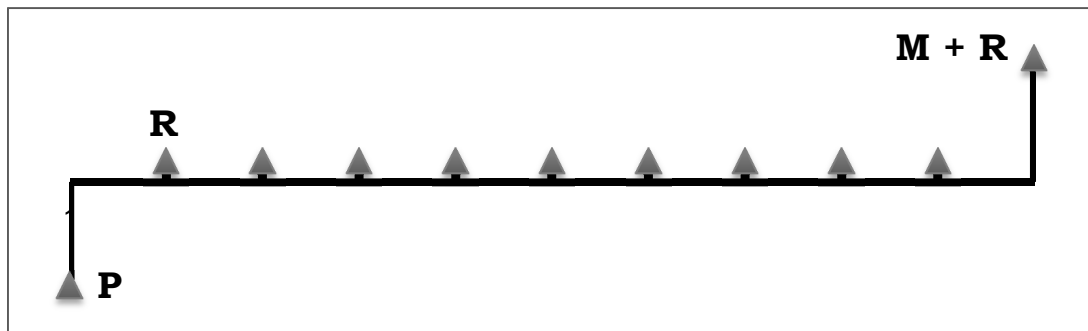
#### 4.1. Leasing contracts (*Ijarah Sukuk*)

*Leasing* can have various types of payback structures. In the simplest form, the payback could be fixed promises of regular payments and not a predetermined promised maturity payment. The formal *Ijarah* contract does not have the option for parties to transfer the ownership of the asset at the end of the period. Thus, at the end of a contract, the asset

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should be returned to the owner (capital owner or the SPV). In order to transfer the ownership back to the issuer at the maturity, one should use lease and purchase (*Ijarah wa Iqtina*) contract. *Ijarah wa Iqtina Sukuk* is form of leasing contract where the ownership of the asset will be transferred to lessee (issuer) at the maturity of the *Sukuk*. However, the maturity payment is not determined at the issuance time of *Sukuk*. The valuation of the asset in this case should be conducted at the maturity time, when the market value of the asset is revealed and maturity payment is set to be equal to that.

Leasing *Sukuk* has fixed and predetermined rental payment (rewards) and a market-value-based maturity payment. However, in practice, the maturity value of the property is, sometimes, fixed and predetermined to both sides of the contract. Therefore, the cash flow pattern of leasing would be similar to that of a coupon-bearing conventional bond such securities are depicted in Figure 6.



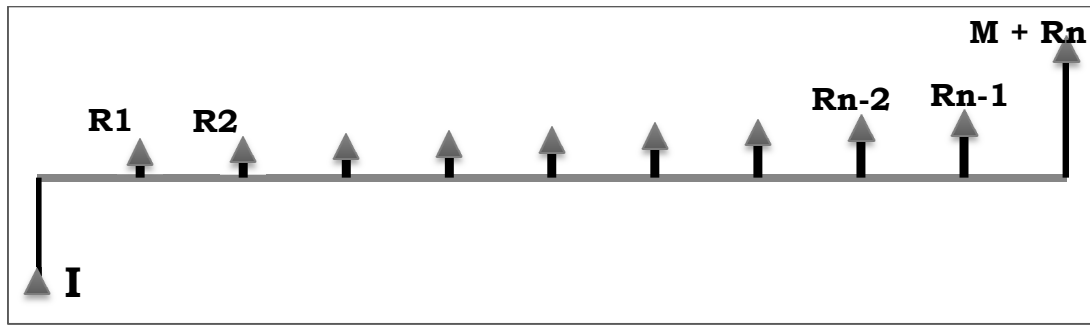
**Figure 6: Cash flows pattern for *Sukuk* with fixed promised regular payments and promised maturity payment**

The valuation of this form of *Sukuk* is similar to a straight bond payoff because of the similarity of cash flows pattern and the tradability. Thus, a *Sukuk* could be priced by using the Equation 1, which is from Williams (1938).

$$P = \sum_{t=1}^N \frac{R}{(1+r)^t} + \frac{M}{(1+r)^N} = \frac{R}{r} \left[ 1 - \frac{1}{(1+r)^N} \right] + \frac{M}{(1+r)^N} \quad (1)$$

In Equation 1,  $P$  is the price of *Sukuk* security,  $R$  is the amount of periodical promised payment,  $M$  is the amount of predetermined maturity payment,  $r$  is the discount rate, and  $N$  is the number of time periods remaining to maturity.

Another variation of cash flows of *lease Sukuk* happens when the periodic payments follow a growth pattern. The maturity payment ( $M$ ) should be based on market value (hence, a priori undetermined), while the  $R_i$ , the amount of promised regular payment (rental fees) in period  $i$  is following a predetermined constant growth model with growth rate of  $g$ . However, in practice, maturity payment of lease is predetermined and mentioned in contract documents. Therefore, its cash flow is similar to the one in Figure 7.



**Figure 7: Growing promised regular payments pattern with predetermined promised maturity payment**

The cash flow pattern of *Sukuk* consists of a growing annuity of promised regular payments and a promised maturity payment. Thus, using the formula for calculating the present value of an annuity, one can formulate the price of a *Sukuk* security as Equation 2.

$$P = \sum_{t=1}^N \frac{R}{(1+r)^t} + \frac{M}{(1+r)^N} = \frac{R_1}{(r-g)} \cdot \left[ 1 - \left( \frac{1+g}{1+r} \right)^N \right] + \frac{M}{(1+r)^N} \quad (2)$$

In Equation 2,  $P$  is the price of *Sukuk*,  $r$  is the discount rate,  $N$  is the number of periods to maturity,  $g$  is the growth rate of promised regular payments, and  $R_1$  is the amount of first promised regular payment. It is assumed that the promised payments are growing at a constant rate of  $g$ , thus,  $R_2 = R_1(1 + g)$ .

#### 4.2. Musharakah Sukuk

The simplest form of cash flow generated by a *Musharakah Sukuk* security is obtained from those securities that only pay a lump sum amount of cash in a certain and predetermined point of time in future at maturity. There is no cash payment to investors prior to maturity as shown in Figure 8.



**Figure 8: Zero-promised regular payment cash flow pattern of *Musharakah Sukuk* securities**

The amount of maturity payment, however, is not determined and should be based on the performance of the underlying investment. However, as in most practice cases, the maturity payment is fixed and predetermined.

This form of cash flow is the same as conventional discount bond cash flow or a bond with balloon payment. Thus the same valuation process is applicable. The valuation of these forms of *Sukuk* could be performed using the conventional pricing approach as follow. The current price of *Sukuk* is the maturity payment (face value) discounted to the present time, similar to discount bonds.

$$P = \frac{M}{(1+r)^{T-t}} \quad (3)$$

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In Equation 3,  $P$  is the price of *Sukuk*,  $M$  is maturity payment (face value),  $T$  is maturity date,  $t$  is time, and  $r$  is the discount rate. It should be noted that  $r$  should not be based on any interest bearing benchmark.

Diminishing *Musharakah Sukuk* described in a previous section as ideal for venture capital funding may possess payoff structure in a manner that it only pays some promised regular payments at certain periods of time with zero maturity payment. Amount of promised regular payments are fixed and predetermined. Cash flow pattern of such security is depicted in Figure 9. Cash flow represented in Figure 9 is identical to a constant annuity. Thus, in order to evaluate the price of a diminishing *Musharakah Sukuk*, present value of annuity is applicable. This will result into Equation 4.

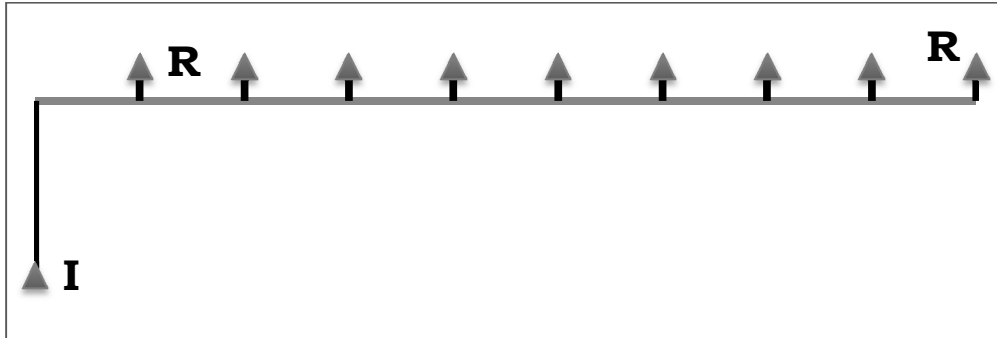


Figure 9: Fixed promise regular payment cash flows pattern of *Sukuk* without promised maturity payment

$$P = \sum_{t=1}^N \frac{R}{(1+r)^t} = \frac{R}{r} \left[ 1 - \frac{1}{(1+r)^N} \right] \quad (4)$$

In Equation 4,  $P$  is the price of diminishing *Musharakah Sukuk* security,  $R$  is the amount of periodical promised payment,  $r$  is the discount rate, and  $N$  is the number of time periods remaining to maturity.

In diminishing *Musharakah Sukuk*, amount of promised regular payment in period  $i$  is following a predetermined constant negative growth (declining) model with growth rate of  $g$ , which is a negative number. The cash flow diagram is presented in Figure 10.

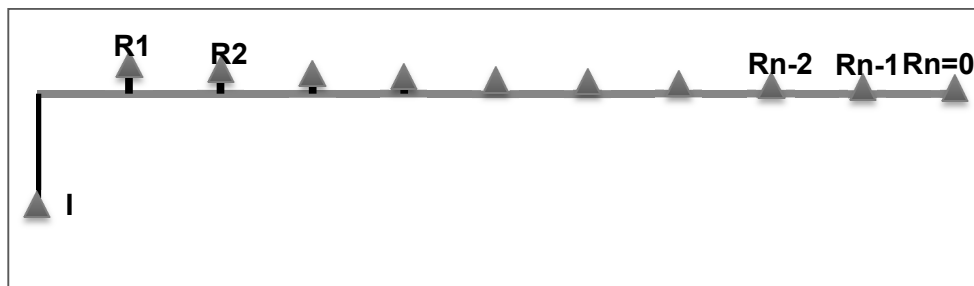


Figure 10: Declining promised payments cash flows pattern

In other words, the cash flow stream of regular payments declines to zero at maturity ( $M$  is also equal to zero). Thus, price of a diminishing *Musharakah Sukuk* can be formulated as Equation 5.

$$P = \sum_{t=1}^N \frac{R}{(1+r)^t} = \frac{R_1}{(r-g)} \cdot \left[ 1 - \left( \frac{1+g}{1+r} \right)^N \right] \quad (5)$$

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In Equation 5,  $P$  is the price of diminishing *Musharakah Sukuk*,  $r$  is the discount rate,  $N$  is the number of periods to maturity,  $g$  is the negative growth rate of promised regular payments, and  $R_1$  is the amount of first promised regular payment. It is assumed that the promised regular payments are declining at a constant rate of  $g$ , thus,  $R_2 = R_1 (1 + g) < R_1$ .

### 5. CONCLUSION

An important experimentation is on over just about over a decade to trade new form of debt contracting with (i) targeted financing, (ii) risk-sharing, (iii) temporary asset transfer to lenders and (iv) pricing such securities with higher yielding debt that are increasingly favored as being attractive for both governments and private borrowing. We explained the structuring of such contracts as being novel, pricing as being symbiotic that takes into account the joint nature of entrepreneurship and financing. Though very small in comparison with the conventional debt market, this new debt contracting is likely to grow as attractive debt contracting in developing countries as well as being attractive for financial institutions: its growth in recent years is about 42 per cent. There are six different instruments being traded in some 14 locations around the world while the size of the private OTC market in major capital centers is larger.

This new debt contracts are very different form conventional bond terms, and yield higher returns to investors for same quality and term to maturity. Obviously some design features of this purpose-directed funding priced as *risk-and-profit-loss-sharing* contracts make this a high cost funding, which the issuers are willing to pay. The payoff structures are identified in this paper, which suggests that the pricing formulas for these securities are quite different from those used in conventional bond markets. The challenge for policy makers is to regulate this market carefully to ensure that the agency problem embedded in these contracts is managed successfully. Continuing work on valuation of these contracts is a challenge for future research. There is an urgent need to find the correct pricing formulas for investors to use for valuation analysis so as to have comparative statistics against the market prices.

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# STILL THE CONVERGENCE MACHINE? WHY CONVERGENCE IS SO SLOW IN THE EU

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**Abstract:** Although a recent World Bank study finds that income convergence in Europe has been far superior to East Asia, in reality European performance leaves much to be desired. Since 2008 convergence has given way to divergence in Southern Europe. In many eastern member states, the crisis undid much of the previous gains such that overall progress remains modest. This sharply contrasts with the speed of convergence in East Asian countries. Three elements characterise East Asian convergence: (1) An activist state (2) asymmetric integration allowing countries to enjoy the benefits of a liberal global economy while not exposing their domestic economies to the full pressures of that system and, (3) A macroeconomic regime promoting investment and protecting against excessive real exchange rate appreciation. European integration, instead, discourages all three elements. The reason for this developmental model is that the EU increasingly sees competition from low wage countries, including its own periphery, as sparking off a race to the bottom. That zero-sum interpretation, in turn, gained prominence due to the low growth rates that have characterised the EU ever since the macroeconomic policy regime in the member states gradually shifted to an absolute priority for low inflation.

**Keywords:** Central Banks and their Policies, International Relations and International Political Economy, Economic Growth and Aggregate Productivity Regional Government Analysis

## 1. INTRODUCTION

With the publication of its 1993 report on Asian growth the World Bank sparked a debate on development policy that has not yet died down (World Bank 1993). The report very much was a refutation of the post 1945 orthodoxy that development required a big and interventionist state in order to provide guidance as well as infant industry protection. The Latin American debt crisis of 1982, in retrospect, marked the beginning of the end of that orthodoxy with more and more countries embracing economic openness, the most spectacular cases being China since Deng Xiao Ping and India since Manmohan Singh's tenure as minister of finance. *The East Asian Miracle* forcefully argued that the most successful cases of convergence, namely those in East Asia, clearly demonstrated that the new liberal orthodoxy of sound macroeconomic policy plus liberalisation succeeded where the old interventionist orthodoxy had failed.

But the World Bank's view was not shared universally. In a rare instance of an open challenge to the American dominance of the World Bank and the International Monetary Fund (IMF), the Japanese government contested much of the findings culminating in efforts to create Asian-led alternatives to, in particular, the IMF (Lee, 2008; Wade, 1996). What was a heterodox view in the 1990s seems well on its way to become the new orthodoxy (Wade

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2012). At the World Bank, its new chief economist Justin Yifu Lin, is extolling the virtues of new structural economics, which would seem another term for industrial policy (Lin, 2009, 2012; Lin and Chang, 2009). Yet, the World Bank's new thinking on effective convergence strategies apparently does not extend to Europe. In its 2012 report *Golden Growth* (Gill and Raiser, 2012), the Bank praises Europe's unprecedented and unrivalled success in raising the living standards of its poorer members by means of policies that very much are in line with the recipes it promoted in *The East Asian Miracle*.

What to conclude from the coexistence of two successful models of convergence that are build on theoretically incompatible models? One conclusion might be that there is not just “one economics and many recipes” (Rodrik, 2007), but many economics as well. Maybe the mechanisms of economics work differently in different areas of the world such that logically incompatible models of development may both be right. As this paper will argue, a more plausible conclusion is that the depiction of the EU as a convergence machine driven by market integration is highly misleading. First, much of the indeed spectacular catch-up of West European economies after the Second World War occurred before 1980 when European countries maintained different currencies, resorted to what is currently called financial “repression”, sought to contain inflation primarily by means of wage and price policies instead of monetary control and engaged in a wide variety of industrial policies. Secondly, as the EU model of development gradually came to conform more and more to the recipes advocated in the *East Asian Miracle*, overall convergence performance slowed down. For the southern member states, convergence has given way to divergence since 2008, Many of the Eastern member states also experienced severe depression during 2008-2010 and although most of them have returned to growth, the high variability of growth since the collapse of communism means that catch-up over the last two decades has been modest. In fact, the only successful case of rapid catch-up the EU can point to after the 1980s is Ireland.

Rather than positing a dichotomy between Washington Consensus type strategies producing successful convergence in Europe but not elsewhere, the experience of the EU might serve to confirm many of the lessons from Asia. What most successful cases of catch-up seem to have in common is a high level of gross fixed investment as a share of GDP, an activist state seeking to overcome coordination dilemmas plus non-reciprocal integration in the world economy (Amsden, 2004; Booth, 1999; Chang, 2003; Reinert, 2007; Stiglitz, 1996). From that follows that three ingredients seem essential for a successful catch-up strategy. (1) A growth oriented monetary policy promoting high rates of capital investment implying a willingness to tolerate moderately high inflation. (2) An international economic environment that allows for a strategy of asymmetric integration. (3) The willingness and ability of the public authorities to help overcome endemic coordination problems, and to prevent convergence promotion from degenerating into pure rent-seeking.

On all counts the EU has moved in a less convergence-friendly direction since the 1980s. In response to the “Great Inflation” of the 1970s, EU member states have progressively moved to a monetary policy approach that denies responsibility for growth and gives priority to keeping inflation around the 2% mark. While intended to promote competition and more flexible markets, the introduction of a single market in financial services, in combination with a common currency has massively destabilised the EU's periphery (Notermans, 2012). Although “in Europe, capital behaves the way it should” (Gill and Raiser, 2012) by flowing downhill, much of it went into financing unsustainable housing and consumption booms or excessive public deficits. Unable to overcome is high unemployment and anaemic growth rates, the EU's economic governance was increasingly characterised by an attempt to intensify economic integration while avoiding that competition from lower wage members would spark a race to the bottom. As a result the non-reciprocal integration into the world economy on which many East Asian countries depended during their growth phase is not available to the EU periphery. This is best reflected in the requirement that all new members adopt the *Acquis Communautaire* in its entirety thus making it harder to employ development

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tool such as undervalued currencies, selective credit rationing, tariff protection and state aid to industry. Finally, it is doubtful to what extent the ability to use the tools of a developmental state are present in the EU. The EU's preference for technocratic, rule-based economic governance is designed to increase the autonomy of policy-making from societal interests but it comes at the price of rigidity. As at least the experience of East Asia would seem to indicate, a developmental state does require substantial autonomy from the main interest groups in order to prevent rent-seeking but it also requires a high dose of pragmatism and flexibility.

The remainder of this paper proceeds as follows. Section two compares convergence performance in the EU with some of the East Asian success cases. Section three claims that the main reason for the overall anaemic growth in the EU lies in a restrictive monetary policy regime. Section four argues that developmental policies have become increasingly difficult to apply under the trajectory regional integration has taken in the EU since the 1980s. Section five concludes

### 2. CONVERGENCE IN EUROPE AND EAST ASIA

The history of the world economy since the 18<sup>th</sup> century is little else than the story of the Great Divergence and its consequences. As a result of the industrious (De Vries, 2008) and subsequently the industrial revolution, global differences in per capita GDP increased radically since the late 18<sup>th</sup> century (Clark, 2007; Madison, 2003). The United Kingdom and the Netherlands were the first to escape the Malthusian trap as they turned into the world's first industrial and service economies, respectively. As prosperity was largely coterminous with power, the Great Divergence set in motion frantic efforts to catch-up but until the late 19<sup>th</sup> century high levels of prosperity remained confined to Western Europe and its offshoots (Table 1). To a considerable extent this was because the European empires ignored Adam Smith's (2007) dictum that common sense should make a whole nation regard the riches of its neighbours as a probable cause and occasion for itself to acquire riches instead, Europe sought to assign its colonies to the role of primaries suppliers and outlets for manufactured exports and capital. Indeed, the prosperity of western offshoots such as Canada, Australia and New Zealand was to no small extent due to the fact that, after the lost colonial war in what was to become the USA, Britain decided to grant them a large degree of self-rule including the right to set their own taxes and tariffs and run an industrial policy.

Based on exports of primary goods, income levels in some Latin American countries rapidly increased in the last quarter of the 19<sup>th</sup> century when advances in transportation and communication technology made large scale export to Western Europe and the US possible. Around 1913, per-capita GDP in Argentina, the most successful economy, was roughly at a par with industrialised countries (della Paolera and Taylor, 2001). But since the 1930s all of Latin America lost ground with the result that income levels relative to the USA were lower at the end of the 20<sup>th</sup> century than they had been in the year 1900 (Astorga *et al.* 2005). Although it initially met with considerable success, the attempt of the Soviet Empire to close the income gap on the basis of a communist command economy dismally failed. But the end of communism did not turn the tide. After 1989, the countries of the former Soviet Union dramatically lost ground with trade patterns largely reverting to a colonial pattern of exporting raw materials in exchange for manufactured imports.

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**Table 1: World GDP per capita in 1990 international GK Dollars**

	1500	1600	1700	1820	1870	1913	1950	1973	2001
Western Europe	771	890	998	1,204	1,960	3,458	4,579	11,416	19,256
Western Offshoots	400	400	476	1,202	2,419	5,233	9,268	16,179	26,943
Eastern Europe	496	548	606	683	937	1,695	2,111	4,988	6,027
Former USSR	499	552	610	688	943	1,488	2,841	6,059	4,626
Latin America	416	438	527	692	681	1,481	2,506	4,504	5,811
Japan	500	520	570	669	737	1,387	1,921	11,434	20,683
Asia (excluding Japan)	572	575	571	577	550	658	634	1,226	3,256
Africa	414	422	421	420	500	637	894	1,410	1,489

**Source:** Maddison (2003)

Successful catch-up required the development of a competitive manufacturing base (Williamson, 2006) and the only countries outside of Western Europe and its offshoots that, up to now, have been able to do so are located in East Asia. Japan was the first non-Western country to join the ranks of industrialised nations in the early 20<sup>th</sup> century. In what was reminiscent of Akamatsu's Flying Geese pattern, other Asian nations followed Japan's lead after the Second World War. The first were the so-called Asian tigers, South Korea, Taiwan, Hong-Kong and Singapore, all of whom by now have reached the income level of OECD countries. Since the 1990s a second wave of Asian countries has embarked on rapid income growth, though per capita GDP levels in China, Indonesia, Malaysia, Thailand and Vietnam currently still are considerably below OECD level.

According to Gill and Raiser (2012) however, Europe is by far the most successful case of post-war convergence, even considerably outstripping East Asia. The main evidence for this claim consist of a negative (-0.80) and statistically significant correlation between the initial level of PPP consumption in 1970 in 26 European countries and its annual growth rate for the period 1970-2009. The same coefficients for a set of 15 Asian and 22 Latin American counties instead are found to be considerably weaker; -0.21 for Asia and -0.25 for Latin America (Gill and Raiser, 2012). In addition they provide a comparative table of Geary-Khamis (GK) PPP annual growth rates of per capita GDP for some of the world regions since 1820. The comparison shows that during 1950-73 and 1994-2008 growth rates in Southern Europe were considerably higher than those in Western Europe and that the same holds for Eastern Europe since 1994. The 1994-2008 growth rates in Eastern Europe are also considerably higher than those in East Asia, while the same is true for the 1950-73 South European growth rate, with the exception of Japan (Gill and Raiser, 2012).

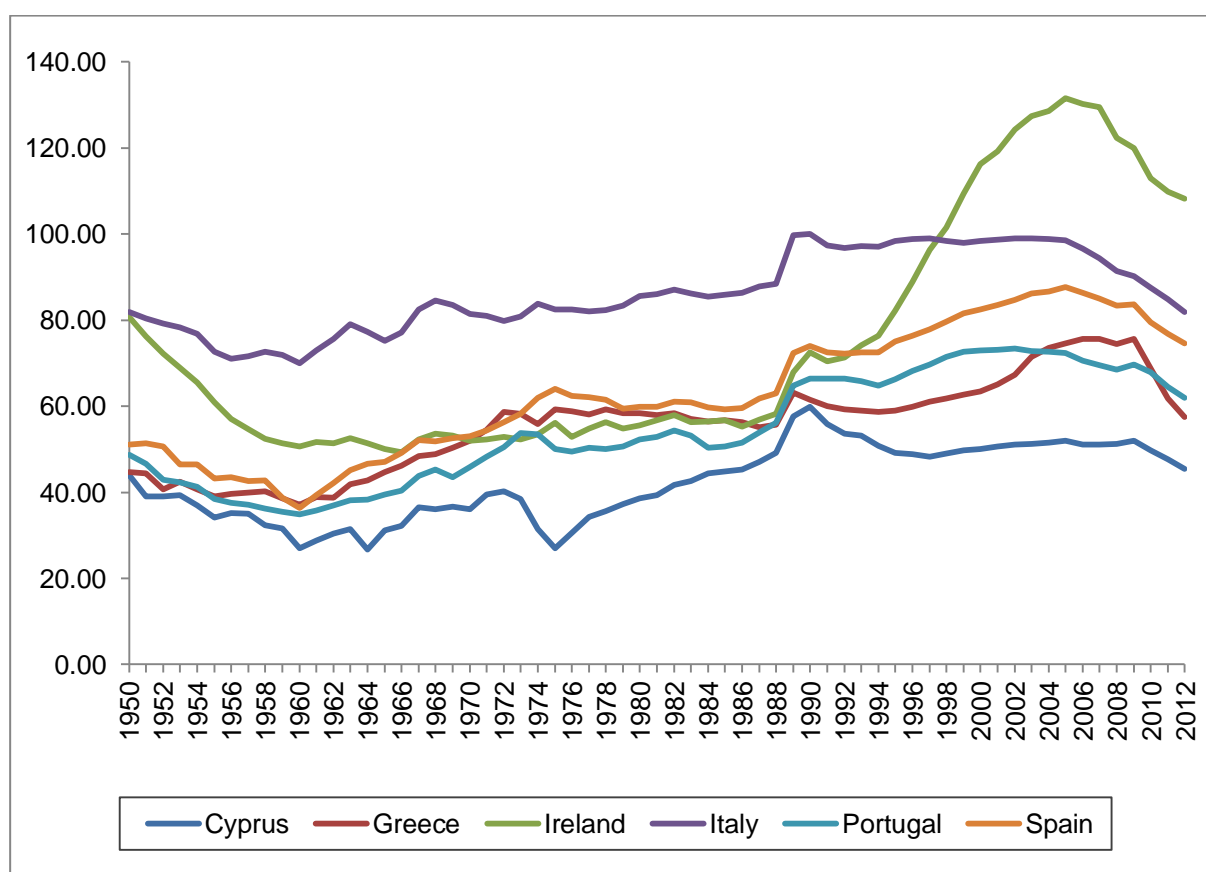
However, a better impression of the degree of convergence might be gained from looking directly at the gaps in PPP per capita GDP. Moreover, it is know that the GK method tends to overstate the income levels of poorer countries, a problem not encountered by the Eltöto, Kovacs and Szulc (EKS) method (Ackland *et al.* 2013).

Figure 1 looks at the development of per capita GK<sup>1</sup> PPP per capita GDP of all the countries that have applied for EFSF/ESM assistance plus Italy since 1970. Two things stand out. Since the onset of the crisis all countries have lost ground with respect to Germany, and overall convergence performance has been rather modest, with the exception of Ireland. Italy managed to close the gap with Germany after German unification but in 2012 its relative income level is roughly where it was in 1950. Cyprus also has hardly made any progress since 1950 and experienced a widening of the gap since joining the EU in 2004, although it did make respectable progress in the 1970s and 1980s. All other countries have gained

<sup>1</sup> EKS data for Germany are only available after 1988.

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ground on Germany since 1950. Spain, the most successful South European economy managed to reduce income gap with Germany from 51.1% in 1950 to 74.6% in 2012, i.e. by about 0.37 percent per year. Overall, Greece has virtually made no progress at all since joining the EU in 1981; although it did manage to reduce the gap from 44.7% in 1950 to 57.5% in 2012. Although slightly better, Portugal's overall performance also is rather modest. Its income level relative to Germany stood at 48.7% in 1950. By the time it joined the EU this had improved to 51.5%, to reach 61.9% in 2012. Ireland, which joined the EU in 1973, instead made spectacular progress and despite significantly losing ground since the onset of the crisis, its income level remains above the German one.



**Figure 1: GII CPS per capita GDP relative to Germany in 1990 GK Dollars (%)**

Source: Conference Board Total Economy Database, January 2013.

Note: German data before 1990 refer to West Germany only.

Table 2, instead, looks at convergence in the eleven Eastern member states since the end of communism in 1989. Five of these countries in fact experienced a widening of the gap with Germany since 1989 (Croatia, Hungary, Latvia, Lithuania, and Rumania). Of the six countries that did make progress Poland, Estonia and the Slovak republic managed to reduce the gap by more than 10 points whereas progress since the end of communism is very modest in Bulgaria, Slovenia and the Czech Republic. Moreover, the onset of the crisis in 2008 did not give rise to divergence only in Poland and the Slovak Republic, although progress is modest in the latter case. By 2012 Estonia however, has recovered most of the ground lost to Germany since 2008 while the decline is modest in Bulgaria, but in Slovakia and the Czech Republic income has decreased relative to Germany since 2008.

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**Table 2: East European PPP per capita GDP relative to Germany in 2012 EKS Dollars (%)**

	Bulgaria	Croatia	Czech Republic	Estonia	Hungary	Latvia	Lithuania	Poland	Romania	Slovak Republic	Slovenia
1989	28.9	56.2	63.1	38.0	53.5	39.1	48.9	35.2	30.1	47.4	68.1
1990	25.6	51.2	61.2	34.3	49.2	39.6	46.3	31.1	26.3	45.3	61.0
1991	22.8	38.5	51.9	29.8	41.4	33.3	41.8	27.6	22.0	36.9	53.1
1992	21.1	33.9	51.0	25.8	39.8	22.7	32.5	27.9	19.9	34.0	49.6
1993	21.7	31.8	51.8	24.6	40.4	20.8	27.8	29.4	20.6	35.1	51.9
1994	21.9	32.8	52.2	24.1	40.9	21.2	24.6	30.2	21.0	36.4	53.5
1995	22.5	34.7	54.8	25.7	41.0	21.0	25.5	31.8	22.3	37.9	56.6
1996	20.6	36.8	57.0	27.4	40.9	22.0	26.8	33.6	23.1	40.2	58.2
1997	20.2	38.8	55.7	30.5	41.7	23.9	28.5	35.4	21.5	41.3	60.0
1998	21.0	39.0	54.6	32.2	42.7	25.0	30.1	36.5	20.1	42.2	61.0
1999	21.2	38.0	54.6	31.8	43.4	25.5	29.3	37.5	19.6	41.4	63.2
2000	22.0	38.3	55.3	34.2	44.1	26.4	29.6	38.0	19.5	40.8	64.0
2001	22.9	38.9	56.3	36.1	45.2	28.2	31.2	37.9	20.4	41.6	64.9
2002	24.2	40.5	57.7	38.8	47.4	30.5	33.5	38.5	21.5	43.5	67.5
2003	25.9	42.7	60.1	42.3	49.5	33.2	37.2	40.2	22.8	45.8	69.8
2004	27.6	44.0	62.3	44.8	51.4	36.0	39.7	41.9	24.5	47.5	72.0
2005	29.4	45.5	66.0	48.7	53.1	39.6	42.6	43.1	25.4	50.2	74.4
2006	30.4	46.0	68.1	52.0	53.2	42.7	44.3	44.2	26.4	52.3	75.9
2007	31.6	46.8	69.7	54.4	51.6	45.5	47.2	45.6	27.2	55.8	78.5
2008	33.4	47.2	71.0	51.8	51.4	43.7	48.1	47.4	28.9	58.1	80.2
2009	33.4	46.2	71.3	47.1	50.5	38.1	43.2	50.6	28.4	58.0	77.8
2010	32.4	43.6	70.1	46.9	49.0	36.3	42.1	50.4	27.0	57.9	75.5
2011	32.2	42.3	69.2	49.5	48.4	37.3	43.3	50.9	26.8	57.8	73.7
2012	32.4	41.1	67.8	50.6	47.5	38.8	44.3	51.7	26.8	58.8	71.5

**Source:** The Conference Board Total Economy Database, own calculations

How does the performance of the European periphery compare to East Asia? Table 3 looks at income convergence relative to the USA since 1950, in the EU's Southern and Eastern periphery as well as in selected Asian countries. Although the World Bank may see Europe as the champion of convergence, it may not come as a surprise that Japan and the so-called four Asian tigers by far outclass the EU's Southern periphery. All of these five countries were considerably poorer than the southern European periphery in 1950 and are richer in 2012, in many cases considerably so. Especially impressive is the performance of Korea and Taiwan whose income was less than 10% of the US level in 1950, yet by 2012 had managed to overtake Southern Europe's most prosperous economy, Italy.

The EU's eastern periphery of course has embarked on a convergence path only since 1989. Comparing the speed of convergence of the four tigers to Eastern Europe it again emerges that convergence in East Asia proceeds considerably faster than in the EU. Poland has been the most successful case in Eastern Europe, reducing the gap to the USA by 17 points since 1990. Yet this compares unfavourably to the growth spurts of Japan, Hong Kong and Singapore in the 1960s and 1970s, and to South Korea and Taiwan, whose economic take-off occurred in the 1970s. Finally, comparing the performance of the Eastern periphery with what might be called the second wave of Asian industrialises, the spectacular speed of convergence in China stands out. Malaysia and Thailand's performance is comparable to Estonia, Eastern Europe's second best performer. Convergence in Indonesia and Vietnam still remains very modest indeed although it should be noted that, with the exception of Japan, all Asian countries have continued to gain ground on the USA even since the outbreak of the global financial crisis.

In sum, on a somewhat closer scrutiny of the data the World Bank's claim that Europe's convergence machine far surpasses even East Asia might seem a bit exaggerated, to say the least. With the notable exception of Ireland, both the speed and extent of income convergence in East Asia are much more impressive than the performance of the EU's



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Southern and Eastern periphery. Nevertheless, to characterise Europe as a convergence machine is not entirely without ground, but its major success cases are in Western Europe.

**Table 3: PPP per capita GDP relative to the USA in 2012 EKS Dollars (%), EU periphery and East Asia**

<i>Southern EU Periphery</i>											
	1950	1960	1970	1980	1985	1990	1995	2000	2005	2010	2012
Cyprus	28.2	28.8	41.0	45.8	50.9	60.3	50.0	47.7	47.3	49.4	45.8
Greece	25.5	35.3	52.5	61.4	57.2	54.9	53.3	53.6	60.2	60.7	51.6
Italy	40.8	58.2	72.0	78.8	75.8	78.3	77.9	72.9	69.7	67.7	64.3
Portugal	22.6	27.0	37.7	44.8	41.5	48.3	48.8	50.2	47.6	48.7	45.2
Spain	27.2	32.2	50.0	58.9	55.8	61.8	63.4	65.2	66.2	65.6	62.6
<i>Eastern EU Periphery</i>											
	1950	1960	1970	1980	1985	1990	1995	2000	2005	2010	2012
Bulgaria	14.9	22.2	27.5	28.2	26.0	20.9	18.6	17.0	21.7	26.1	26.5
Croatia						41.8	28.6	29.6	33.6	35.2	33.7
Czech Republic						50.0	45.2	42.8	48.8	56.5	55.6
Estonia						28.0	21.2	26.4	36.0	37.8	41.5
Hungary	37.4	46.5	48.3	49.0	45.7	40.2	33.9	34.0	39.2	39.6	38.9
Latvia						32.3	17.4	20.4	29.2	29.3	31.8
Lithuania						37.8	21.1	22.8	31.4	34.0	36.3
Poland	29.5	32.7	33.9	35.6	31.5	25.4	26.3	29.3	31.8	40.7	42.4
Romania	17.5	23.1	26.9	31.6	28.5	21.5	18.4	15.1	18.7	21.8	22.0
Slovak Republic						37.0	31.3	31.5	37.0	46.7	48.2
Slovenia						49.8	46.7	49.4	54.9	60.9	58.6
<i>Japan and the Four Tigers</i>											
	1950	1960	1970	1980	1985	1990	1995	2000	2005	2010	2012
Japan	21.6	37.9	69.6	77.8	79.7	87.2	86.8	76.8	75.3	77.5	75.8
Hong Kong	21.5	25.6	35.1	52.3	57.0	70.0	77.6	71.1	78.2	93.3	96.4
Singapore	29.6	26.0	37.7	62.2	66.0	78.2	94.8	94.5	98.0	121.5	121.8
South Korea	8.1	9.9	13.1	20.2	24.9	34.2	44.7	47.6	53.9	64.9	66.7
Taiwan	9.8	12.2	17.2	28.9	33.3	43.8	55.6	59.2	64.1	78.1	79.9
<i>East Asia's Second Wave</i>											
	1950	1960	1970	1980	1985	1990	1995	2000	2005	2010	2012
China	2.8	3.4	3.0	3.4	4.3	4.7	6.8	7.0	11.0	18.5	21.0
Indonesia	5.5	5.9	5.2	6.6	6.3	7.1	9.0	7.4	8.1	10.2	10.9
Malaysia	15.3	12.7	13.0	18.5	18.8	20.7	27.0	25.7	26.9	31.1	32.2
Thailand	5.9	6.6	7.8	9.6	10.2	13.9	18.5	15.4	18.1	21.1	21.5
Vietnam	4.7	4.8	3.4	2.8	3.1	3.0	3.9	4.3	5.4	7.3	7.7

**Source:** The Conference Board Total Economy Database, own calculations.

Table 4 lists income levels of what might be called the core countries of the EU, relative to the USA. With the exception of Luxembourg which already had a higher income in 1950, all countries gained ground on the US until 1980. Progress was especially impressive for low income Austria, Finland and France. EKS data for Germany are not available before 1989, but GK data, which yield a roughly 10% higher income level for 1989-2012, do confirm the German postwar *Wirtschaftswunder*. German GK per capita GDP stood at 44.8% of the US level in 1950, reached a peak of 83.1% in 1982 and subsequently declined to 70.5% in 2012. West European convergence notably slowed down after 1980, and 2012 income levels were below those of 1980 in Belgium, Denmark, France, Germany and the Netherlands, Western Europe's success thus largely occurred in the first three decades after 1945, but this was a period when economic policies confirmed much closer to the East Asian strategy than has been the case afterwards (Laski and Romisch 2004).

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Up until the early 1980s especially the poorer members such as Belgium, France (and Italy) applied many instruments that were also used in East Asia. First, economic integration was clearly asymmetrical. The early post-war American plans for free trade, convertible currencies, and fixed exchange rates were soon scuttled against the background of economic problems and the emerging cold war. Currencies remained inconvertible until late December 1958. In 1949 most West European currencies, moreover, devalued substantially relative to the Dollar. Much of international trade was state-directed and discriminated against the USA while governments did much to promote exports to the USA. In 1958 the EEC customs union was founded which in itself discriminated against non-members while trade liberalisation between the six was stepwise, with transition periods of up to ten years, and applied only to trade in goods. Second, industrial policies played a crucial role especially in Italy, France and Belgium. As in many East Asian countries selective credit rationing was widely employed to direct credit to priority sectors whereas monetary policies focussed on keeping interest rates low. Third, international emulation was of importance, especially through the Marshall plan, which promoted the diffusion of knowledge about American production and management techniques (Hardach, 1994).

**Table 4: PPP per capita GDP relative to the USA in 2012 EKS Dollars (%), EU core countries**

	1950	1960	1970	1980	1985	1990	1995	2000	2005	2010	2012
Austria	44.9	66.6	75.1	85.7	82.4	84.3	85.0	84.5	84.7	91.5	92.3
Belgium	63.0	67.7	77.9	85.9	79.8	81.8	81.8	80.0	79.8	85.3	84.3
Denmark	76.4	81.9	88.8	86.3	88.3	83.7	86.9	84.2	82.0	81.5	80.4
Finland	45.8	56.7	65.6	71.8	72.2	74.9	66.8	71.6	75.1	78.7	78.8
France	56.7	68.3	79.4	83.2	78.4	79.6	77.6	74.3	72.8	73.7	72.5
Germany						81.7	82.6	77.3	73.8	80.7	82.0
Luxembourg	124.1	124.2	122.5	119.1	120.0	140.3	149.9	161.8	168.0	175.4	170.6
Netherlands	71.3	83.2	90.6	90.4	84.2	85.0	86.7	88.1	85.6	91.2	88.7
Sweden	75.8	82.4	90.9	86.4	84.0	81.6	77.0	78.2	82.3	89.5	91.3
UK	78.5	82.5	77.5	75.3	73.9	76.6	77.2	77.1	81.2	82.0	79.4

**Source:** The Conference Board Total Economy Database

Yet, the EU did not come to apply the same principles to the less developed countries that joined since the 1980s. Instead, the new developmental model was built around “sound” macroeconomic policies, market friendly microeconomic policies and the concept of a level playing-field; i.e. economic integration should serve to allow companies from different member states to compete on equal terms with no explicit recognition of the need for “special and differential treatment” of less developed members.

### 3. CONVERGENCE AND THE MACROECONOMY

Notwithstanding the disagreement about the role of the state and economic integration in promoting convergence, there does seem to be agreement that macroeconomic policies play a secondary role. Those advocating an activist developmental state analyse convergence primarily in a microeconomic perspective with an emphasis on how to overcome coordination failures and travel the learning curve of manufacturing in an international environment dominated by more advanced industries (Amsden, 2004; Breznitz, 2007; Chang 2003). The consensus view in the EU, as reflected also in the *Golden Growth* report, limits macroeconomic policies to providing the stable background against which the microeconomic adjustment crucial to convergence can take place. In practice this means an emphasis on keeping consumer price inflation in the range of two percent, irrevocably fixing exchange rates, preferably in the form of a common currency, and reducing public debts. Restarting the convergence machine instead will be up to market-friendly policies that improve microeconomic flexibility and the business climate.

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Gill and Raisers's conclusion that the current crisis merely calls for a strengthening of the policies that have been pursued for the last three decades in essence would seem to rest on a *petitio principii*. Since the theory states that a sufficiently flexible economy will quickly absorb no matter how severe a shock, unsatisfactory economic performance must always lead to the same policy conclusions. Yet, this primacy of microeconomic solutions is somewhat puzzling as a strong case can be made that the main shocks to European growth rates were of a macroeconomic nature. The slowdown of economic growth after 1980 was intimately related to the switch to a macroeconomic policy regime which sought to keep inflation down by means of tight money and fixed exchange rates. Economic convergence stalled in the 1990s when most West European countries gave priority to meeting the tight EMU entry criteria. Moreover, the onset of income divergence since 2008 is clearly not related to market-unfriendly microeconomic policies. Indeed, just before the onset of the Eurozone crisis, Boeri and Garibaldi (2009) concluded that the gradual disappearance of mass-unemployment showed that the microeconomic reforms of the last three decades had born fruit and Eurosclerosis was a thing of the past. Nor is the current crisis a result of what commonly would be considered unsound macroeconomic policies. Consumer price inflation remained low in the run-up to the crisis and, with the exception of Greece private indebtedness and not excessive public debts and deficits were the main factor that triggered the financial meltdown and the Eurozone crisis (Jorda *et al.* 2013). In particular, the EU's macroeconomic orientation has increasingly come to hinder convergence through three specific channels: through its depressing effects on capital formation, by provoking widespread real exchange rate appreciation on the periphery, and by stimulating asset booms.

The central pillar of East Asian success was a high investment rate (Rodrik, 1995; Teranishi and Sachs, 1994). But, as the current financial crisis has made clear again, the supply and demand of investable funds is essentially a macroeconomic problem. The demand for investment funds by individual firms will depend both on their expected increase in market share and the expected overall growth rate, but as gains and losses in market shares between firms cancel out, aggregate demand for credit is de facto a function of expected growth. The supply of aggregate investment funds through the financial system, for the same reason will hinge essentially on expected growth rates. But since a growing economy will require a growing money supply the central bank has the power to strongly influence the overall growth expectations through its monetary regime (Notermans, 2000; Werner, 2005; Temin, 1989).

Since the 1980s European monetary policy has come to deny any responsibility for growth but instead accords absolute priority to keeping inflation in check. In practice such policies work by reducing economic activity whenever demand pressures in the markets for goods, services and labour emerge. A monetary policy which reduces the level of economic activity whenever it is deemed to threaten the 2% inflation target will make consistent growth well-nigh impossible. Indeed, as the *East Asian Miracle* notes, average inflation rates in the countries studied amounted to roughly 8% (World Bank, 1993). As a result of this policy orientation, the real GDP growth rate of the Euro area has been consistently below that of the EU as a whole, whereas the EU, in turn, performs worse than both the advanced economies as a whole and the global economy at least since 1980.

Moreover, the European monetary regime provides an explanation for a major difference between East European and East Asian growth. In Eastern Europe the source of growth was mainly total factor productivity and not accumulation as in the East Asian countries. This as such is problematic since it essentially points to a more efficient use of existing resource and capital stock without an investment dynamics having taken root that might form the basis of self-sustained and sustained high growth rates required for catching up (Bini-Smaghi, 2009; Stiglitz, 1996).

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Another lesson the World Bank drew in 1993 was that the East Asian economies did not cling to a given nominal exchange rate (or inadequate rate of nominal depreciation) in the face of continuing inflation but depreciated when necessary, sometimes quite sharply (World Bank, 1993). In Europe instead, the common currency and hard pegs have led to an almost continuous real appreciation of the periphery since the late 1990s. Higher growth rates will commonly be accompanied by higher inflation rates, partly due to the Balassa-Samuelson effect, and higher nominal unit labour-cost increases which means that EMU created a built-in brake on convergence (Bini-Smaghi, 2009). Moreover, whereas EMU was supposed to discipline inflation behaviour in its members, the reduction of risk premia after the introduction of a common currency provoked massive capital inflows, which had rather the opposite effect. Much the same process can also be observed in the Eastern European countries that adopted a hard peg (Stark, 2009).

From the late 1990s to 2008 monetary union, currency pegs and the single market in financial services did indeed fulfil the expectation of boosting growth on the periphery. But the massive capital inflows, and corresponding current account deficits, proved to be a poisoned chalice, as investors channelled much of these funds to fuel real estate booms, consumption booms, or unsustainable budget deficits. Exclusively focussed on consumer price inflation, the monetary regime could be counted on not to put a damper on asset price speculation while simultaneously discouraging “productive” investment. The abolition of pre 1980 instruments of selective credit rationing and cross-border capital controls aggravated matters by making it impossible to channel capital inflows to more desirable projects. When subjected to a “sudden stop” in 1997 the affected East Asian countries reacted with a strategy of undervalued currencies in order to build up massive currency reserves while in some countries capital controls were instituted at the height of the crisis. ERM2 / Eurozone membership and EU Directive 361/1988, however meant that both instruments were unavailable in the EU to prevent a further destabilisation of peripheral countries.

### 4. A LEVEL PLAYING FIELD: THE EU'S DEVELOPMENTAL MODEL SINCE THE 1980S

In the Flying Geese pattern of regional development relocating lower value-added activities to less developed countries while moving up the ladder of production is beneficial to both the sending and receiving country. But for this to be the case, GCFC needs to be sufficiently high such that the destruction of capital and the labour shedding involved in the relocation of less productive firms will be compensated by capital formation and employment creation in more productive sectors. Once this is no longer the case a Flying Geese pattern may easily come to be interpreted as a threat to the more highly developed countries. The flight of the geese no longer promises increased prosperity for all but instead transmutes into a race to the bottom.

It is essentially this switch to a zero-sum interpretation, driven by the EU's macroeconomic regime, which explains why the European developmental model has come to erect increasingly high hurdles to non- reciprocal integration. If absolute cost advantages are seen to be determining the global distribution of economic activity, and if dissociation is neither possible nor desirable, then the high-cost EU would only seem to have two options; dismantling the “European Social Model” or exporting as much of it as possible so as to raise the cost structure of its competitors. Accordingly, the EU came to reject the idea of non-reciprocal integration for peripheral countries and insisted that all new members adopt the entire *Acquis Communautaire*. Since the 1980s this strategy has come to dominate the EU's position not only, concerning enlargement, but also in trade (Meunier, 2007) and neighbourhood policies (Tovias, 2010).

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The international trade strategy, for example, focussed on the Singapore issues; investment, competition, government procurement and trade facilitation. Because the export of the EU's rules in investment matters, government procurement and competition would hamper many of the instruments that made the FG models a success in East Asia, such encompassing regional trade agreements (RTA) are of little attractiveness to many of the EU partners that do not harbour any hope or desire to eventually enter the Union. RTA negotiations with India have been dragging on without result since 2007 and much the same holds true for the Economic Partnership Agreements the EU seeks to conclude with a host of countries in Africa and the Pacific (Khorana and Garcia, 2013).

The opening move in this policy reorientation was the Single European Act (SEA), implemented between 1986 and 1992, which removed many NTB's although it remains incomplete in the field of services. In the wake of the SEA competition policy became an exclusive competence of the EU (Warloutzet and Witschke, 2012). Article 101 TFEU prohibits all measures restricting or distorting competition, thus implicitly assuming that market failures are irrelevant in convergence processes. Although already included in the Rome treaties, competition policy necessarily had to remain a paper tiger as long as the creation of "national champions" was a core element in the catch-up strategies of especially France and Italy. While also outlawed in the Rome Treaties, the application of competition policy to state aid equally remained a dead letter, partly because no mechanisms were provided for enforcing the prohibition. Since the 1980s state aid has also come under the provision of the EU's competition policy. But here the powers of the EU are considerably weaker than in the other fields of competition policy (Wilks, 2005) mainly due to the ill-operationalized provision that exemptions can be made for state aid that promotes "general economic development". Nevertheless crucial elements of "financial repression" such as "preferential interest rates and favourable loan terms" are now considered inadmissible (Rutkiewicz, 2011).

Following the philosophy of the SEA, towards the end of the 1990s a set of Commission directives created a single market in financial services. The EU's insistence on the free movement of capital meant that it became very difficult for the Eastern member states to protect their own firms with the result that much of the manufacturing sector and most of the financial sector was transferred into foreign hands. Competition between foreign banks in the newly opened up areas of Eastern Europe, did much to spark the consumption and real-estate bubbles that were to have such dramatic consequences since 2008 (Reinert and Kattel, 2013). Extensive foreign ownership in manufacturing tends to promote an enclave economy with few backwards and forwards linkages and only limited technological and managerial spillovers (Ellison, 2008; Ferry and McMaster, 2013; Jacoby, 2010). As Jacoby (2010, p.425) notes "*.. though illegal under EU law, many investors imposed 'vertical restraint agreements' prohibiting their own CE [Central European, TN] affiliates from using technology transferred to them for any production activities outside the framework of their joint-venture agreement with their Western partners.*" East Asian states, in contrast, actively tried to avoid the risk of enclave economies by means of a variety of strategies ranging from discouraging FDI and promoting the acquisition of foreign technologies by domestic firms (Japan, S. Korea) to joint ventures and local content requirements (Taiwan, China).

In addition, the emphasis on a level playing field for most Eastern states EU membership entailed a significant reduction of the instruments and amounts available for attracting foreign investment. Industrial processing zones, for example were outlawed by the EU in Hungary. Temporary monopoly concessions in order to increase the incentives for large scale FDI were equally incompatible with EU rules whereas significant limits were placed on the use of tax breaks to attract FDI (Ellison, 2008). Finally, one may add to this mounting pressures, especially from France and Germany, to harmonise corporate taxes as they are seen to bestow an unfair competitive advantage.

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With its cohesion policies the EU, does admit a need for special and differential treatment for less developed regions. Although it is the second largest expenditure item, support generally amounts to no more than 2.5% of GDP in the new member states and the policy is widely criticised for its inefficient management (Borgloh *et al.* 2012). Indeed the finding that the industrial structure of the major recipients of regional aid, Spain, Portugal and Greece, suffers from serious structural problems that have intensified since the introduction of the Euro (Simonazzi *et al.* 2013) testifies to the inefficiency, if not the counterproductive effects, of these policies.

Moreover, the reorientation of cohesion policies increasingly comes into conflict with classic developmental state strategies. The shift to horizontal, as opposed to vertical aid reduces the ability to channel support to priority sectors. Moreover, the effort to concentrate structural and cohesion spending on the poorest regions makes little sense in the presence of industry clustering due to external economies of scale and thus hinders a coherent strategy.

### 5. CONCLUSION: STILL THE DARK CONTINENT?

Given Europe's allegedly superior convergence performance, the World Bank does not think there are many lessons to be learnt from East Asia. But the reality of the peripheralisation of Southern and Eastern Europe does not support this complacency. The EU's model of reciprocal integration with its emphasis on creating a level playing field has led to an impoverishment of the industrial structure of its periphery,<sup>2</sup> such that there are increasingly loud voices calling for the (re)introduction of (Asian style) industrial policies in the EU (Aiginger 2012; Lyberaki, 2001). The single market in financial services has helped split the EU in debtor and creditor countries with Southern and Eastern Europe having had to pay a high price for their dependence on capital inflows; a mistake that could have been avoided had the EU been willing to draw lessons from the financial liberalisation in Asia in the early 1990s and the ensuing crisis of 1997. Whereas the exchange rate management of most Asian countries sought to safeguard their export competitiveness, monetary union in the EU periphery was bought at the price of serious real appreciation with debilitating effects on its specialisation structure.

But the key to restoring the lustre of the European economic model lies in a change to a monetary policy regime that recognises growth and not the containment of inflation as the first priority. As long as monetary policy can be expected to put its foot down at the first signs of growth, no durable growth will emerge and the EU will be unable to shed the zero sum philosophy that precludes non-reciprocal interrogation and differential treatment of its less developed areas.

But such a change is palatable neither to the Eurozone's southern periphery nor to the core members. What drives European monetary policy still today is the experience of the Great Inflation. Fragmentation of both the political and industrial relations system in the Eurozone's periphery in combination with the high growth and low unemployment of the 1960s led to the distributional conflicts that drove the Great Inflation. Although suffering much less from both types of fragmentation, the northern Eurozone countries eventually also decided that it would be easier to manage the economy, and in this case improve their competitiveness relative to the Southern periphery, under the external constraints of the Euro. With untested democratic systems and often weak and fragmented civil societies most Eastern member states did not even try to run an autonomous monetary policy but decide to buy credibility through hard pegs, currency boards and the ERM2 from the start.

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<sup>2</sup> Vespignani (2013) finds that monetary forgetting in Australia negatively affected the construction industry and manufacturing while leaving banking and mining unscathed. It might be worthwhile to conduct a similar investigation for the EU

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Hence, it cannot be taken for granted, even when assuming the political will and the possibility to reorient their strategies in an East Asian direction, that most peripheral EU member states would be able to manage their economies without the fiction that the world economy is a zero-sum game and the immutable constraints of tight money and fixed exchange rates. As Rodrik (1995) stresses, the insulation of governments from domestic interest groups was crucial for the success of developmental strategies in Taiwan and South Korea in order to prevent rampant rent-seeking. One might wonder, e.g. whether a Greek government might be able to muster the required degree of autonomy (Mitsopoulos and Pelagidis, 2011). Europe hence continues to cherish its self-imposed shackles, but this mode of governance also proves to be increasingly dysfunctional not only in economic but also in political terms.

In the concluding chapter of his magisterial *Dark Continent*, Mark Mazower (1998) argued that the main challenge facing post WW2 Europe was no longer to prevent the clash of aggressive nationalisms but to establish a working relationship between capitalism and democracy. From the vantage point of 2013 one might easily conclude that the EU is able to manage neither. The reaction to the Inflation of the 1970s was more technocratic government in the form of a central bank isolated from society and constitutionally protected from the need to consider wider social and economic concerns, equipped with an absolutist, rigid and allegedly universally valid doctrine. The reaction to the Eurocrisis proceeds in the same vein as now fiscal policy making is to be removed from democratic control and equipped with an equally rigid doctrine preferably protected by constitutional provisions (van Rompuy, 2012). But this sacrifice of democracy also turns into a threat to the market economy, as the economic performance of the last few years shows. As inequality and regional disparities rapidly increase and a small highly productive technologically advanced sector plus a well-provided for and well-connected public service elite comes to coexist with rapidly growing numbers of unemployed and working poor, the rift between a political class committed to the EU and a sceptical public must even grow wider. In that constellation it is no longer unthinkable that the pre-1945 ghosts of Europe that Mazower thought banned will spring back to life.

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# POST-SOCIALIST CAPITAL MARKET: WHY NOT THE FELDSTEIN-HORIOKA PUZZLE?\*

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**Abstract.** The Feldstein-Horioka puzzle is often referred to as evidence of poor capital mobility between countries. One might expect that integrated economies (such as in the EU) would lead to the end of this puzzle. On the contrary, disintegration would be likely to produce this puzzle. The Comecon's members, especially former Soviet republics, have suffered such a destruction of common economic space last several decades. However, we find that the Feldstein-Horioka puzzle is not clearly observable among these countries. We try to find an explanation in the sense of ties between economic actors. The specific circumstances of the post-socialist transformation made it more or less difficult to run long-time investment projects. Therefore, investments in these countries were not constrained in this way and could "choose" their direction relatively freely. It brings us to the conclusion that the Feldstein-Horioka puzzle is a characteristic of economic actors and their environment to a greater extent than capital market frictions per se.

**Keywords:** The Feldstein-Horioka Puzzle, Capital Market, Post-Socialist Transformation

## 1. INTRODUCTION

Starting with classical work by Feldstein and Horioka (1980) there has been intense concern about the flexibility of the international capital market and the cross-country mobility of real capital. Namely, strong and sustainable dependence between rates of investment and rates of savings among OECD countries was demonstrated. Such a contradiction to the traditional theory of integrated capital market became so-called Feldstein-Horioka puzzle.

A number of explanations have been proposed, but none of them, in fact, could be taken once for all. On the other hand, recent research points out that the Feldstein-Horioka puzzle has to some degree "weakened" due to the process of globalization and economic integration in Europe. Thus, one could expect that deeper integration lead to "exhausting" of the puzzle. Indeed, at the subnational level there is no puzzle (Helliwell and McKittrick 1999).

In the same time, recent history gives us an example of destruction of a common economic space. This is the case of the Comecon members, especially – the former republics of the USSR and Yugoslavia. But, as we'll show, the data hardly allow us to speak about "born" of the Feldstein-Horioka puzzle for this group of countries.

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We suppose that the Feldstein-Horioka puzzle is a characteristic of economic actors and their environment to a greater extent than international capital market frictions per se. Our hypothesis, in which we follow the existing literature on dynamic moral hazard, is that long-term investment projects are consistent with the optimal path of the capital quantity involved in the projects. Hence, the capital couldn't easily change the direction of its applying. Not only are market frictions responsible for this but also the characteristics of long-term projects.

From this point of view, disintegration of the Comecon didn't lead to the Feldstein-Horioka puzzle because the specific conditions of the post-socialist transformation made it more or less difficult to run long-term investment projects. Therefore, investments in these countries were not constrained in this way and could "choose" their direction relatively freely.

In section 2 we briefly discuss existing explanations of the Feldstein-Horioka puzzle. Section 3 contains analysis of the dependence of investments on savings for the former Comecon members. Then in section 4 we consider possible influence of long-run investments on capital mobility. At last, in section 5 we make some conclusions about investment climate of the post-socialist countries.

### 2. EXPLANATIONS OF THE FELDSTEIN-HORIOKA PUZZLE: WHERE ARE WE NOW?

The Feldstein-Horioka puzzle has been the subject for a great number of works trying to give an explanation for it. Roughly, there are two ways of thinking about the causes underlying the puzzle. First is to examine possible market frictions and some other imperfections and restrictions. These could be official capital controls (Westphal, 1983), current account constraints (Summers, 1985; Coackley *et al.* 1996), existence of non-traded goods and immobile factors (Engel and Kletzer, 1987), informational asymmetry (Gordon and Bovenberg, 1996), transport costs (Obstfeld and Rogoff, 2000), exogenous debt limits (Castro, 2005), country-specific risk of expropriation (Stulz, 2005). Quite recently Bai and Zhang (2010) showed that the Feldstein-Horioka puzzle can be a product of interactivity between two types of financial frictions: limited enforcement over the contract and "limited spanning" (when only incontinent bonds are available for financial operations).

The other way is to introduce some stochastic process or differences between countries. Stochastic processes could lead to a shock within national economy and produce a divergence between national marginal productivity of capital and the world interest rate. In that case a comovement between investments and savings occurs due to the logic of the real-business cycle. Numerous works shed light on the explanatory possibility of shocks in factors productivity (Finn, 1990; Mendoza, 1991; Baxter and Crucini, 1993; Obstfeld, 1986) and population growth (Obstfeld, 1986). What is important is that no factors of capital immobility are involved in the analysis in these studies.

On the other hand, the question about low international mobility of capital is close to the question imposed by Lucas (1990): "Why doesn't capital flow from rich to poor countries?" Indeed, it seems likely that when return on capital in a rich country is higher than in a poor one, capital will move from the latter to the former. But it doesn't seem likely in a counter situation. And not only because of risks, bad government and so on, but first of all because of difference in effective labor (i.e. labor multiplied by technological coefficient). According to the Lucas model of economic growth, the capital per effective labor ratio should be equalized for all countries. Hence, rich countries with intense technological progress have higher investments and to the great extent use domestic savings.

Also differences in country-sizes could produce comovement between investment and savings besides any constraints of capital movements (Ho, 2003).

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Unfortunately, there is no universal explanation of the Feldstein-Horioka puzzle. Miscellaneous reasons could be posed as its “generators”, but it’s difficult to find out any crucial reason which determines the puzzle’s existence. Moreover, explanatory power of some models depends on appropriate calibration of parameters. For example, in Mendoza (1991) significant correlation between investments and savings is a result of a persistency of technological shocks and the degree of risk aversion.

Another problem is sustainability of the Feldstein-Horioka puzzle. It is not clear why random shocks in productivity lead to the investment-savings dependence in a perspective of ten or fifteen years. Important observation is that force of the Feldstein-Horioka puzzle is not constant. Blanchard and Giavazzi (2002) argue that the integration in Europe relaxes the dependence of investment on savings within Euro area. Also a weakening of correlation between savings and investments in the OECD countries was reported (Helliwell, 2004). For the contrary Feldstein (2005) found that this weakening is distinctive for the smaller OECD countries, but not for the larger.

So, evidence of the influence of integrative process on the Feldstein-Horioka puzzle is contradictory. On the one hand, one could conclude that integration eases capital flows from poor small economies to large ones, while, following Lucas, there are no reasons to invest much in poor countries. On the other – one could suppose that real integration has taken place only in the EU.

To clarify this we would try to approach from the other side, and scrutinize the disintegrative process in the former “socialist camp” rather than integration in the world economy.

### 3. DOES DISINTEGRATION LEADS TO THE FELDSTEIN-HORIOKA PUZZLE?

As is well known transformation in the “socialist camp” entailed disintegrative processes in two ways. First, the USSR, Yugoslavia and Czechoslovakia were split into fifteen, five (nowadays, seven) and two countries respectively. Second, the Comecon ceased to exist. The Comecon consisted of 11 (10 to the moment of dissolution) full members, 1 associate member and 8 observers.

We used data from the World Bank official site. Only for 21 countries of the whole list of The Comecon members (in their present state), we could get enough statistics. To be more precise we used also another one sample (Comecon minus), from which the republics of former Yugoslavia, Albania and Germany are excluded. The motivation is as follows. Yugoslavia was associated member, though it participated in the almost all Comecon institutions. Albania had gotten out the Comecon in 1961 and then gradually moved into isolation. At last only part of Germany was the member of Comecon. The former USSR republics are another subject of our interest, because of its consisting one country and their greater number, comparing to former Yugoslavia and Czechoslovakia.

We would like to test whether the Feldstein-Horioka puzzle, i.e. statistically significant dependence between investment and savings rates, for three groups of countries, mentioned above. In the table 1 the World Bank data about gross capital formation and savings are presented.

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**Table 1. Average gross capital formation and savings in the Comecon members  
(% of GDP)**

Country	1996 – 2010		1996 - 2000		2001 - 2005		2006 – 2010	
	GCF	S	GCF	S	GCF	S	GCF	S
Albania	23.9	16.9	18.8	15.4	24.6	18.8	28.4	16.4
Azerbaijan	30.6	28.1	28.6	9.4	41.8	27.6	21.4	47.2
Belarus	29.1	24.0	25.4	21.6	25.6	23.6	36.4	26.8
Bulgaria	22.7	15.1	14.4	13.0	22.4	16.0	31.2	16.2
Croatia	24.3	19.7	20.6	16.4	25.4	21.0	27.0	21.6
Czech Republic	28.3	24.9	30.0	27.0	27.8	24.2	27.2	23.4
Estonia	29.9	22.2	28.6	21.2	32.0	22.6	29.2	22.8
Germany	19.2	21.9	21.6	20.2	18.2	20.8	17.8	24.6
Hungary	24.1	18.5	26.0	20.2	25.0	17.6	21.2	17.8
Kazakhstan	25.5	23.6	18.6	16.8	27.4	25.2	30.4	28.8
Kyrgyz Republic	20.7	12.5	20.0	5.2	15.2	14.2	26.8	18.2
Latvia	27.4	19.2	21.6	14.8	30.0	20.4	30.6	22.4
Lithuania	22.1	15.0	22.0	12.6	21.8	15.4	22.4	17.0
Moldova	26.7	17.3	24.4	12.4	24.4	19.4	31.4	20.2
Mongolia	32.5	29.5	28.4	26.2	30.2	27.4	38.8	35.0
Poland	21.8	17.9	23.8	20.0	19.6	16.4	22.0	17.4
Romania	23.1	16.9	20.2	14.0	22.4	16.6	26.8	20.0
Russian Federation	20.7	28.4	19.0	26.0	20.8	30.6	22.4	28.6
Slovenia	26.4	24.6	25.8	24.4	25.6	25.0	27.8	24.4
Ukraine	21.9	22.7	20.6	20.6	21.6	27.6	23.4	19.8
Vietnam	34.0	29.9	28.6	25.0	34.0	32.6	39.4	32.0

**Source:** Estimated on the basis of the World Bank data (<http://data.worldbank.org>)

We run the Feldstein-Horioka regression in its original specification (Feldstein, Horioka, 1980), i.e.

$$\left(\frac{GCF}{GDP}\right)_i = a + b \left(\frac{S}{GDP}\right)_i$$

The results of the estimation of the Feldstein-Horioka coefficient (b) are presented in the table 2.

**Table 2: The Feldstein-Horioka coefficient**

	Comecon				Comecon minus				USSR			
	1996-2010	1996-2000	2001-2005	2006-2010	1996-2010	1996-2000	2001-2005	2006-2010	1996-2010	1996-2000	2001-2005	2006-2010
b	0.50	0.32	0.63	0.15	0.52	0.30	0.63	0.17	0.25	-0.04	0.52	-0.13
Standard error	0.15	0.15	0.23	0.17	0.15	0.16	0.23	0.18	0.23	0.20	0.45	0.19

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At first glance, there is no contradiction to the idea of highly disintegrated capital market for the Comecon members. The value of  $b$  for the period 1996 – 2010 is significant and high enough, comparing to 0.14 reported by (Blanchard and Giavazzi, 2002) for the initial Euro-area members in 1991- 2001.

Further investigation, however, brings some doubt that the Feldstein-Horioka coefficient reflects the deep disintegration of the capital market. If we pass from “Comecon” to “Comecon minus” we will find that in 1996 – 2010 “Comecon” had lower  $b$  than “Comecon minus”. But “Comecon minus” consists of the countries with a more integrated past than “Comecon”. Moreover, one might expect that disintegrative processes would increase over time. Indeed, some countries of the former Comecon became the EU-members, some countries, which had appeared at the place of the bigger ones, proceeded in their sovereignty. But, to the contrary the Feldstein-Horioka coefficient in 2006 – 2010 is lower than in 1996 – 2000 for the all three samples.

The Feldstein-Horioka coefficient isn't statistically significant everywhere at the 5 % significance level. For “Comecon” it is insignificant only in 2006 – 2010, but for “Comecon minus” – in 1996 – 2000 and 2006 – 2010. For “USSR” the Feldstein-Horioka coefficient is insignificant in every period, furthermore sometimes has negative value which is hardly interpretable in the sense of integration. Since the value of  $b$  for “Comecon” doesn't differ much from its value for “Comecon minus” in the same 5-yers-long periods, we could conclude that exception of countries, poorer integrated in Comecon, doesn't quite important.

Of course, one could think that such result is a consequence of integration in the world capital market. But it seems strange that the former republics of the USSR are more integrated in the world market than those members of the Comecon who are nowadays the members of the EU. Especially, those such as Germany and Slovenia that are included in “Comecon” but not in “Comecon minus”.

Capital market imperfectness doesn't look like a cause of the Feldstein-Horioka puzzle. If so, in the long-run they should be less considerable than in short-run. Yet, from the table 2 it's observable that for the period 1996 – 2010 the dependence of investments on savings is stronger than in the 5-year-long periods, except for 2001 - 2005.

These examples show that disintegration which has occurred after the downfall of socialism in most countries, not is a “generator” of the Feldstein-Horioka puzzle. The Feldstein-Horioka puzzle is absent in the former USSR and not obviously present in the former Comecon. Therefore, the Feldstein-Horioka puzzle doesn't necessary follow disintegration, and vice versa we couldn't conclude from appearing (disappearing) of the puzzle to appearing (disappearing) of disintegration.

Consider the dynamics of  $b$  in 1996 – 2010 year-by-year (figure 1). First of all, any trend is hardly to be detected for the whole period. From 1996 to 2005 the dependence between investments and savings rate in GDP tended to grow up, while in 2006 – 2008 it went down. The dynamics for “Comecon” and “Comecon minus” is quite similar. The “USSR” dynamics has few differences: it growth faster in the period 1999 – 2003 and more abruptly drops down after 2005; and get the lowest point in 2007 while “Comecon” and “Comecon minus” – in 2008.

An interesting feature of the dynamics of the Feldstein-Horioka coefficient is that it rises in the period of so-called restoration growth in many post-socialist countries, primarily on the territory of the former USSR, and decreases during the global financial crisis. If one would like to persist in the view that the Feldstein-Horioka puzzle primarily caused by the poor integration of the international capital market, one has to allow that the market is the better integrated during economic disturbances.

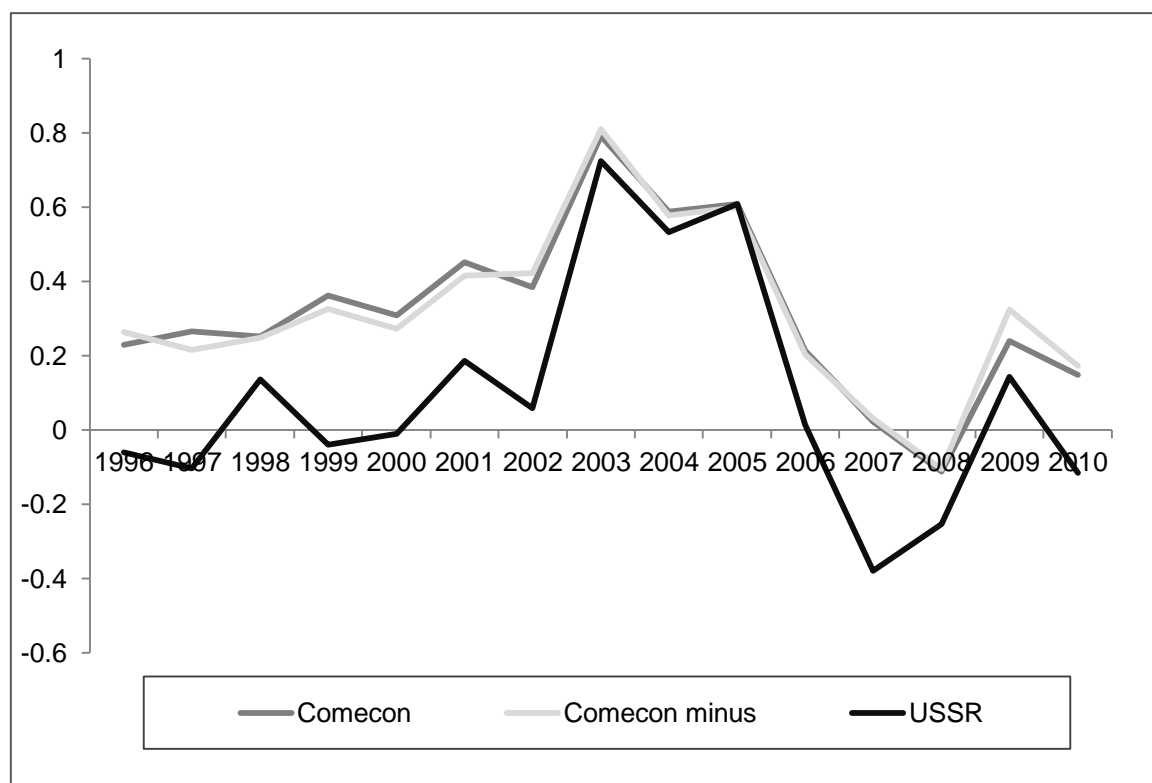


Figure 1: The Feldstein-Horioka coefficient in 1996-2010

#### 4. LONG-TERM INVESTMENTS AND THE FELDSTEIN-HORIOKA PUZZLE

Now we'll discuss the influence of long-term investments on the mobility of capital on the international market. The crucial reason why such investments could give rise to the Feldstein-Horioka puzzle is that such investments need some plan of capital accumulation. Such accumulation hinders the investment of earnings in other projects, and make necessary to reinvest some part of them.

In this idea we largely follow the literature on the dynamic moral-hazard problem. Most contracts, particularly long-term contracts, face the problem of incentive structure of the agent. After the seminal work of Becker and Stigler (1974) such an incentive structure considers a back-loaded path of payment to the agent, i.e. a path of payment according to which the agent gets the main reward only in the end of contract. The gain which the agent could take from abusive behavior often depends on amount of capital in her disposal. For example, a financial manager could get kick-back as a percentage from amount, invested in a project. That's why to form the desirable incentives the principal should link the agent's reward to the amount of capital which she operates. On the optimal path reward should rise over time, hence so should the capital (see Myerson, 2012).

The main feature of the long-term contract is that it outlasts the first failure of the agent (Myerson, 2012). To make the situation symmetrical we could also assume that the principal couldn't break off the contract as long as the agent produces the required result, because of reputation lost in that case. So the capital is "tied" to some extent by the long-term contracts, and couldn't move towards to greater returns.

The reinvestments are to be made according the optimal path of payments to the agent. When they are made they would be treated as savings of firms, and on the other side as investments. Since this is so the long-term contracts enforce the dependence of investments on domestic savings. Hence prerequisite for the Feldstein-Horioka puzzle appears.



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What is important it's relative amount of savings and investments that should (and could) be made under the optimal plan. Note, that the optimal path of capital accumulation not only prescribes reinvestment but also limits the total amount of investments, could be made. If savings are large enough, currently active agents couldn't "absorb" their total amount. Excessive savings stimulates new agents to enter on the market. That's why the Feldstein-Horioka puzzle could be weaker in the short-run, than in the long-run. On the other hand, excessive savings are possible to move abroad. But it means that agents in other countries could "absorb" the amount of savings according their optimal plan of capital accumulation, and that domestic savings of the country-recipient are scanty.

It depends on a number of factors whether new agents come to the national capital market or savings move abroad. Development and openness of the market plays role, besides the interest rate, risk, wages in other sectors etc. If it is quite easy to start with intermediary business and to obtain the scale of projects, usual for the "old" agents, and this scale is large enough, we could expect feeble investments abroad. Therefore, capital flows between rich countries with advanced national capital market would be relatively small, and the Feldstein-Horioka puzzle is very expectable. But countries with backward or quite "new-born" markets would scarcely experience the puzzle.

In order to reinterpret the findings of the previous section, the factors, which influence the number and size of long-term investments projects in the former Comecon, should be taken in account. It ought to be mentioned that the former USSR republics suffered the deepest transformational recession among all post-socialist countries. The recession was accompanied by collapse of links between enterprisers, bankruptcy of many large firms, institutional weakness which produced the loss of trust the legal rules in business. Being unprotected from expropriation the owners avoided starting long-run projects. This could be the reason why the Feldstein-Horioka puzzle didn't occur in the former USSR.

Such "recessive" logic could be applied to the case of the Feldstein-Horioka puzzle's relaxation in the vicinity of 2008. The crisis should lead to the default of many long-term optimal contracts, though in practice them often could be implicit. The lack of trust to the major world market actors, to the financial systems of the USA and EU could decrease the number of newly created projects.

Meanwhile the period of 2001 – 2005 was quite successful. The former USSR republics emerged from the recession; three of them together with five former Comecon members joined the EU. Significant stabilization of new institutions (though as before quite waning) was achieved. Slow reintegrative process between the economies of Russia, Belarus and Kazakhstan was started, along with enforcement of the economic affairs between Russia and Germany. All this could produce the effect of strengthening of the Feldstein-Horioka puzzle.

### 5. THE FELDSTEIN-HORIOKA PUZZLE, INVESTMENT CLIMATE AND COUNTRY RISK

The Feldstein-Horioka puzzle seems to be a consequence of development and freedom of national market, on the other hand, and of relative amount of domestic savings transformed to the investments within national economy. We believe that the evidence from the former Comecon is due to the lack of development of national capital markets, which aren't able to "absorb" even their own savings.

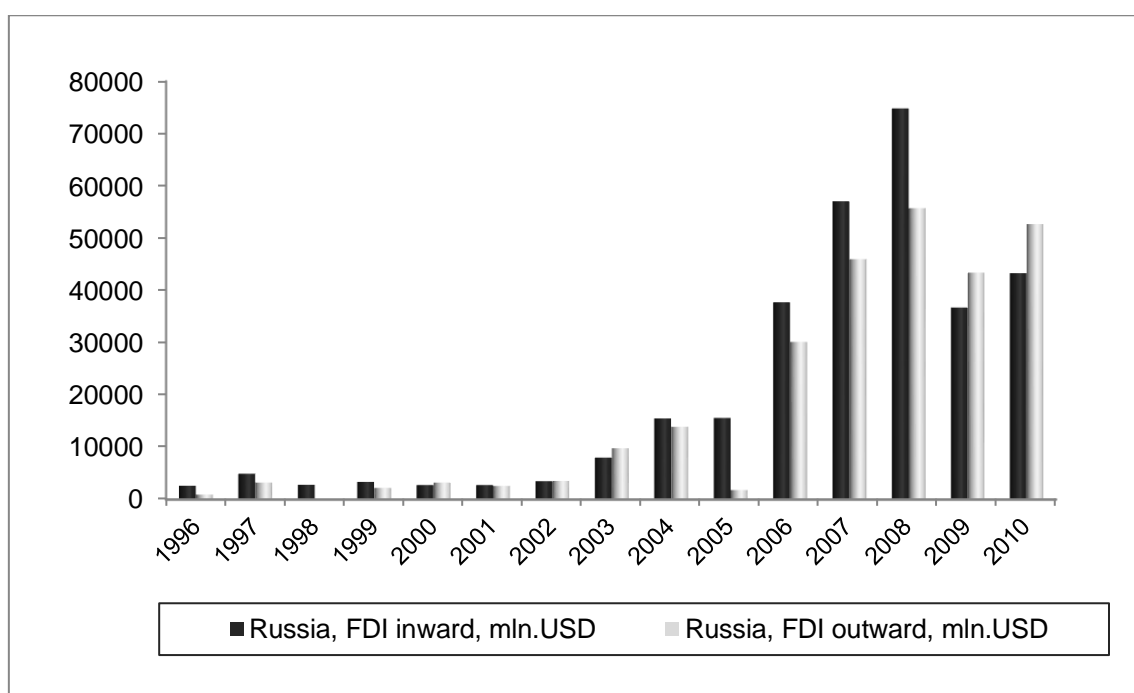
It is possibly appropriate to remind some facts. Investment climate of most of these countries were formed under the influence of similar factors and all these countries have in common, though in varying degrees, the incompleteness of market reforms. One of the key elements of market reforms in the former socialist countries was bid to attract foreign investment. In fact, the main goal of economic and political reforms was to achieve the level of developed countries in the economic sphere. However, the changes in economic mechanism largely

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faced the subsequences of running centralized command-and-distribution system with its distorted investment process.

Countries of the Central and Eastern Europe have been less affected by the socialist experiment but the transference of the Soviet model to other socialist countries took place. By the end of the 60s in all considered countries centrally planned economy was established. Wholesale has been replaced by a system of state procurement. Production plans formed on the basis of the indicators in terms of quantity. Products were sold under the state plan for its distribution, while the volume of unsold products, construction in progress and stocks of raw materials have been eventually increasing.

The main problem of socialistic system is lack of private investments. As a result from the late 70s economic growth in socialist countries slowed down significantly. Investment process recovery was the main problem faced the governments of countries. We can expect that unprecedented benefits provided for foreign investors could lead to paradox appearance. The case of Russia – the most illustrative among post-socialist countries – shows that inward and outward direct investment flows are roughly interchangeable (figure 2).



**Figure 2: FDI Inward and outward, annual, 1996-2010, Russia  
(US Dollars at current prices and current exchange rates in millions)**

Such situation could witness a poor trust for national institutions from the domestic investors, whom pretend to be foreigner because of preferences to them. And probably they expect that these quasi-foreign investments would be more protected against the “sovereign risks”. Risk concerned with investments in the country has the following sense according to the logic of previous section. Country risk decreases ability of an agent to reach the required result by her own efforts. Then the anticipated profits of investors would be lower and, hence, the wage of the agent would be lower. If so there would be fewer incentives for new agents to enter the market. The Feldstein-Horioka puzzle is very likely not to be detected.

We could think of country risk as of a set of factors distorting the ability of economic system to create added value. This ability is conditioned by basic factors – the level and the quality of productive forces and infrastructure development, the quality and worth of human capital

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(common and personal) etc. Among “distorting” factors one can mark out natural, geographical, ecological, historical, social, political, religious, legal, military and so on and so forth, and also – the negative elements of human capital – for instance, ideological education in the USSR that pressed private initiative and predetermined an instinct of “following the leader” that rises the importance of personal factor. In this case it is expedient to “detach flies from the cutlets” as Russians says that is – to carry out ex post and ex ante analysis in attitude to each taken separately country.

It is necessary to confess, that the problem of finding out the volume and the quality of potential reproduction is extremely difficult because the main productive forces are people, i.e. very subjective factor and does not lend itself to unified estimations. One can also find difficulty in hampering factors identification. The question of methodology is staying open. For example, while carrying out an analysis of regression the problem of statistical errors and inconsistency arise. But it is important to make a differentiation of economic and “the rest” factors having an influence on efficiency as a matter of principle.

Fundamentally the heightened country risk hampers general economic development. Instantly it influences upon the main macroeconomic indicators. For instant high risk level rises the cost of borrowings (increases the rate of return required) because of money flowback depreciation, nonpayments possibility and difficulty of “reborrowing” from other entities for the debtor that in itself increase the cost of credit and also results the additional requirements for security and guarantees.

### 6. CONCLUSION

The Feldstein-Horioka puzzle for more than thirty has been an essential challenge to the standard theory of international capital market. A number of theoretical and empirical works tried to shed light on its roots. In our paper we try to put “another brick” in the investigation. First of all, we examine the idea that the puzzle is an evidence of weakly integrated international capital market. We find the former Comecon countries scarcely provide the puzzle, though these countries have suffered an intensive disintegrative process for the last several decades.

If the Feldstein-Horioka puzzle doesn't necessary mean disintegration, another explanation should be made. We try to elaborate it from the theory of dynamic moral hazard. Namely, in order to overcome moral hazard running a long-term project, the optimal contracts should be made which implement the optimal path of capital accumulation. This path prescribes the amount of investments could be made. On the one hand, a part of savings becomes “catch up” by the agents and couldn't move abroad. On the other hand, excessive savings could move abroad or could stimulate new agents to enter national capital market. The appearance of the Feldstein-Horioka puzzle depends on the relative extents of these effects. If national market is quite free, then the puzzle is more likely.

Such suggestions make it possible to glance a new look at the problem of investment climate and country risks. Indeed, country risk should lower the wage of agents and, as a sequence, confine the process of capital accumulation in the economy. The Feldstein-Horioka puzzle could disappear in this case but, paradoxically, it's not a good symptom.

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# THE INTERNATIONALIZATION OF MALAYSIAN FIRMS INTO VIETNAM: ENTRY MODES AND CHINESE NETWORKS

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**Abstract:** This paper examines the Malaysian Chinese firms that have expanded into Vietnam as they represent one of the main conduits of Malaysian outward foreign direct investment into the latter. Based on research and qualitative personal interviews with Malaysian Chinese firms that have invested in Vietnam, the paper unpacks the entry modes that these firms have undertaken. It argues that Malaysian Chinese firms prefer to establish joint ventures in their Vietnamese businesses. This paper also argues that such investments are often embedded in social and intra-ethnic ties which connect them with Vietnam's ethnic Chinese businessmen. To this end, there is a tendency for these firms to rely on informal ties and non-market institutions in the form of the ethnic Chinese business networks. Nevertheless, the Malaysian Chinese firms are not averse to collaborating with non-ethnic Chinese firms that enjoy a good relationship with the Vietnamese state.

**Keywords:** Business Networks, Economic Globalization, Entrepreneurship, Ethnic Chinese Business, Foreign Direct Investment, Southeast Asia

## 1. INTRODUCTION

Since the early 1990s, the phenomenal growth of ethnic Chinese firms, particularly those from East Asia, has sparked research into their management models. Scholarly interest on ethnic Chinese firms and their role in economic development could be seen in terms – such as the 'Chinese commonwealth' (Kao, 1993) and the 'Chinese global tribe' (Kotkin, 1992) – which describe these firms and their activities. Notwithstanding the severity of the 1997 Asian economic crisis and the 2008 global economic crisis, many of these Chinese firms have weathered the fallout relatively well and continued to excel in their business ventures. In addition, the relatively neoliberal policies and stable macroeconomic conditions within Asia has also encouraged Chinese firms to extend their operations across national borders, forming an interrelated 'bamboo network' (Weidenbaum and Hughes, 1996). For the Malaysian firms of ethnic Chinese origin, their success is even more remarkable, given that their position as an ethnic minority excludes them from the majority of socioeconomic opportunities (through the government's implementation of affirmative policy favouring the ethnic majority) (see Hill, 2012). Some scholars have attributed the success of the Chinese firms and entrepreneurs to a unique 'cultural' capacity for them to cooperate amongst themselves as they are grounded in 'a set of beliefs and values which lies behind the behaviour of Chinese businessmen' (Redding, 1990, p.79). Nevertheless, there is another school of thought (e.g. Yeung, 2000; Tsui-Auch, 2004; Dahles, 2008) that explains such activities through a multidimensional process which takes into account the changing institutional contexts in which these firms are embedded in, while not entirely negating the 'cultural' aspects of the ethnic Chinese.

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In the context of Malaysia and Vietnam, their economic interaction has intensified since Vietnam liberalized its economy in its 1986 *doi moi* (renovation) reform. While Vietnam is one of the most important labour providers for Malaysia, Malaysian firms serve as one of the larger sources of foreign direct investment (FDI) in the former. In particular, the Malaysian Chinese-dominated small and medium enterprises (SMEs) represent one of the major conduits in the extension of business networks between these two places. Accompanying such economic transformation is the increasing number of cross-country marriages tying Malaysian (Chinese) men and Vietnamese women. In certain ways, the economic fortunes of both countries are intertwined through these business (and to a smaller extent, socioeconomic) networks.

With the above as a backdrop, the paper intends to analyse the organization of Malaysian Chinese firms in the emerging economy of Vietnam. Vietnam is chosen because it is one of the most favoured places for these firms to expand their activities into. Another reason is that relatively little studies have been conducted on Malaysian investments in Vietnam, despite the growing trade and investment linkages between these two Southeast Asian countries. Based on personal interviews with 46 Malaysian Chinese firms that have invested into Vietnam, this paper argues that Malaysian Chinese firms prefer to form joint ventures when they invest into Vietnam. Such investments are often embedded in social and intra-ethnic ties which take the form of the ethnic Chinese business networks. Nevertheless, the Malaysian Chinese firms are also flexible enough to cooperate with non-ethnic Chinese firms that possess a good relationship with the Vietnamese state. This is particularly true in the property and construction, and finance sectors.

This paper begins with a critique of the literature on the management structures of ethnic Chinese business firms, covering the cultural and the institutional approach. This is accompanied by an identification of the gap in knowledge in the corpus of literature detailing Malaysian Chinese firms. In the next section, the paper offers a brief analysis of Malaysian investment in Vietnam (using data published by the governmental agencies of both countries) followed by the presentation of the hypotheses. It then describes the research methodology before the various modes of entry of Malaysian Chinese firms investing into Vietnam and their major coalition partners in such business ventures are examined. This is followed by a discussion of these findings and their policy implications. The paper concludes with a summary of the main arguments and findings.

## 2. THEORETICAL FRAMEWORK

A review of the management methods of ethnic Chinese firms (from Malaysia or otherwise) illustrates two predominant schools of thought: the culturalist and the institutionalist. The culturalist postulates that the prototypical Chinese enterprise can be described as a duplication of the structure of a traditional Chinese family, with the patriarch as the chief of the enterprise (Tsui-Auch, 2004). With unquestioned authority, the patriarch manages the business with a close and small group of relatives and friends. As the enterprise and the patriarch ages, the son(s) would usually inherit the firm, which is seen as a family asset. In addition, family members are not encouraged to divest their shares to outsiders for fear of losing control and disclosing the firm's financial information (Redding, 1990). When there is a need to acquire external equity (usually through public listing), the family usually tries to control the now public-listed company through an affiliated bank, financial company or holding company (Fukuyama, 1995). This notion of the family is heavily influenced by Confucian ideals, which emphasize obligations to hierarchically arranged authorities, starting from the family and extending to the state. Hence, family members, especially males, are obliged to serve the father (patriarch of the firm) and to safeguard his business (Tsui-Auch, 2004). Furthermore, for these firms and their entrepreneurs, shared ethnicity is regarded as a binding factor within and across borders, which collectively shape these 'bamboo networks' and the broader 'Confucian capitalism'. This version of capitalism is 'characterized by both hierarchical relationships within the family and a system of intra-ethnic reciprocal

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relationships known as *guanxi* (good connections)' (Dahles, 2008, p.489). The core tenet of this approach is 'that the family as a fundamental unit of social and economic organization gives the ethnic Chinese their sense of identity and, at the same time, strengthens their business ties' (Dahles, 2008, p.489). In summary, interpersonal relationships, especially those amongst the ethnic Chinese, serve as the 'glue' in interlinking cooperative relationships of the broader Chinese business networks. However, the culturalist tradition has lost some of its appeal (and even been derided) following the 1997 Asian economic crisis, which negatively affected the East Asian economies and their firms (see Backman, 2001). The opaque ties between many of these firms and their relationships to the political elites have been singled out as the reasons for such a dramatic economic collapse, although imprudent financial management at the firm and national level (amongst many other reasons) played an equally vital, if not more, role in precipitating the crisis (see Sheng, 2009).

Parallel to the culturalist point of view, the institutional theorists stress the influence of place-specific institutions in shaping business practices. Theorists from this tradition highlight the importance of key institutions such as the family structure, inheritance system, power relations, communal networks, and the state (Whitley, 1996), some of which are in turn influenced by the ideological and cultural roots of society (see also Oshima, 1996). More crucially, the role of the state in facilitating or hampering business operations is highlighted. As Tipton (2009, p.409) asserts: 'Government sets the rules, and therefore at any point in time the structures of management in a country reflect the institutions established by states to guide and regulate the economy'. At least within Southeast Asia, the structures of ethnic Chinese firms – be it their close relationship to political elites, their control by insider families, or their dependence on intra-ethnic ties – are partly the results of colonial and postcolonial state attempts to develop state-led industrialization. Despite the best intentions of the Southeast Asian states to nurture industrialization and entrepreneurship, these attempts often fall short of expectations because of a general lack of bureaucratic capacity. The Southeast Asian states' weak capacity has forced them to co-exist and enter into collaborative partnerships with some of the more well-capitalized Chinese businesses, although this type of partnerships is not as straightforward as it usually is portrayed to be (Chua, 2008; Tipton, 2009).

Although these two perspectives are viewed as mutually exclusive, such a dichotomy is often blurred as Chinese firms maintain membership in multiple overlapping networks in their business endeavours, often under the eyes of a state suspicious of their activities (Dahles, 2008). This phenomenon is observed when one analyses large and well-capitalized Malaysian Chinese business firms operating in the country. To this end, Gomez (1999) argues that well-capitalized Malaysian Chinese enterprises were reluctant to cooperate amongst themselves despite the arbitrary nature in which affirmative state policies were implemented. Their lack of enthusiasm is surprising as almost all of these Chinese enterprises were marginalized by affirmative measures that sought to promote the interests of the native majority, often at their own expense. An expected response, as depicted in various studies covering ethnic Chinese business through a culturalist perspective (see Redding, 1990; Kao, 1993; Weidenbaum and Hughes, 1996), is to expect more (rather than less) intra-ethnic cooperation to ward off a hostile state. The response of Malaysian Chinese entrepreneurs – to establish links with the Malay political elite who had access to economic concessions – was thus anomalous if one had adopted a culturalist perspective. This is not to negate the 'Chineseness' of these Chinese entrepreneurs. For instance, Vincent Tan, owner of Cardiff City Football Club and one of Malaysia's richest people, drew criticism from the club's supporters for changing the home jersey colour from blue to red, and the club's mascot from the bluebird to a red dragon in a corporate rebranding exercise in 2012. As noted in a *BBC* article on February 28, 2013 and a *The Edge* article on May 16, 2012, Tan's reasons for the exercise are both cultural and commercial – the dragon and the red colour symbolizes power, strength, luck, and prosperity in many parts of Asia, which is also the fastest growing market for football merchandises. The point here is to highlight that place-



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specific policies and institutional practices of the state shape the business strategies of Chinese entrepreneurs, forcing them to forgo a common Chinese identity and intra-ethnic cooperation (whenever the situation arises) in pursuit of their own goals (Tsui-Auch, 2004). Furthermore, Gomez (2002) reminds scholars of the need to not only focus on culture, shared identities and value systems, but also the contingent nature of a locale's political economy and socio-historical intricacies.

The above review of Chinese entrepreneurship reveals a common point – culture does matter in the growth and expansion of (Malaysian) Chinese firms, but only to a certain degree. In short, a more critical insight incorporating the 'Chinese' characteristics of the Malaysian Chinese firms and the broader institutional environment is needed to analyse their activities. Such a perspective is especially valuable to unpack the globalization of these firms. However, research on Malaysian Chinese firms to date has largely been focused in their domestic setting (cf. Gomez, 2006; Zwart, 2007). Furthermore, there is a lack of research on the processes in which these firms extend their operations across borders. This lacuna is particularly perplexing if one were to compare the works analysing the investment methods and strategies of ethnic Chinese firms from both Hong Kong and Singapore that have invested out of their domestic setting (Smart and Smart, 2000; Dahles, 2002). The paper intends to contribute to this gap in the literature by generating empirical knowledge about the entry modes that Malaysian Chinese firms undertake in their investments in Vietnam. It also investigates the relevance of intra-ethnic ties between the Chinese communities of both countries, and how such relations (if any) are manifested within Vietnam's institutional and historical context. This paper is especially interested in examining Vietnam's ethnic Chinese business community after the community fell out of favour with the ruling Communist government (then known as North Vietnam) that united the country after defeating the pro-business South Vietnamese government in 1975. As illustrated in Thomsen (2011), the anti-capitalist measures after Vietnam's reunification in 1975 had diminished the socioeconomic influence of the country's ethnic Chinese populace, many of whom were already successful in the business arena before the fall of the South Vietnamese regime. These measures did not target any ethnic groups in particular, but the economic success of the ethnic Chinese meant that they had the most to lose and were most negatively impacted by such measures (see Amer, 1996). Although the subsequent *doi moi* reforms in 1986 had helped to revive the fortunes of the Vietnamese Chinese, the severity of Vietnam's anti-capitalist (and anti-Chinese, by extension) campaigns have made their revival more uneven than what is normally portrayed (see also Amer, 1996; Thomsen, 2007), as the following sections would reveal. Within such a setting, this paper aims to unravel how the transnational Chinese business networks linking the ethnic Chinese of Malaysia and Vietnam interact with the larger socio-political institutions of Vietnam.

### 3. MALAYSIA'S INVESTMENT IN VIETNAM

Table 1 presents a snapshot of the *stock* of FDI accumulated in Vietnam by country of origin. As of June 2011, seven out of the top 10 investors in Vietnam originate from Asian countries. More significantly, Malaysia is ranked as Vietnam's fifth largest investor. A historical review of Malaysia's outward *flow* of FDI from the years 2008 to 2012 tells a similar story. Table 2 depicts the top 10 destinations of outward FDI from Malaysia, with Vietnam occupying the seventh position. Within Southeast Asia, Vietnam is emerging as a preferred investment destination outside the long-established recipients – Singapore, Indonesia, and Thailand.

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**Table 1: Stock of foreign direct investment in Vietnam by country of origin, as of June 2011 (USD; Million)**

No.	Country of Origin	Number of Projects	Total Registered Capital
1	Taiwan	2,180	23,165
2	Singapore	918	22,919
3	Korea	2,771	22,808
4	Japan	1,532	21,274
5	Malaysia	382	18,785
6	British Virgin Islands	494	14,798
7	USA	577	13,247
8	Hong Kong	634	8,444
9	Cayman Islands	52	7,432
10	Thailand	245	5,876

Source: Foreign Investment Agency (2011)

**Table 2: Top ten destinations of Malaysia's outward flow of foreign direct investment, 2008-2012 (MYR; Million)**

No.	Destination(s)	2008	2009	2010	2011	2012	Total
1	Singapore	(5,318)	(3,569)	(12,800)	(9,603)	(8,340)	(39,630)
2	Australia	(7,509)	(946)	(6,040)	(7,492)	(4,294)	(26,281)
3	Indonesia	(12,931)	(2,391)	(2,763)	(4,023)	(2,789)	(24,897)
4	Mauritius	(4,236)	(3,649)	(1,659)	(6,526)	1,739	(14,331)
5	British Virgin Islands	(69)	(3,371)	(1,953)	(3,679)	(1,705)	(10,777)
6	United Kingdom	(2,576)	(666)	(2,855)	(1,551)	(460)	(8,108)
7	Vietnam	(1,749)	(837)	(427)	(2,886)	(88)	(5,987)
8	Cayman Islands	(976)	(833)	(1,137)	(1,719)	(1,170)	(5,835)
9	Thailand	(619)	(2,748)	(1,001)	(178)	(1,042)	(5,588)
10	Hong Kong	(214)	(22)	(938)	(549)	(3,146)	(4,869)

Source: Central Bank of Malaysia

While some of the well-capitalized Malaysian Chinese firms have invested in high profile projects in Vietnam (e.g. the Lion Group in retailing and Tan Chong Motor Holdings in automobile assembly and distribution), their entry into Vietnam is also flanked by the comparatively smaller SMEs. Although there is no research that details the equity ownership of the Malaysian SMEs by their ethnicity, various authors have estimated that there is a disproportionately large presence of the ethnic Chinese in the SMEs (see Mohd Sobri *et al.* 2012; Sim, 2012). Mirroring the well-capitalized Malaysian Chinese firms, the SMEs have also been actively investing into Vietnam. While there has not been any substantial research conducted on the investment mechanisms of these Malaysian Chinese firms (both well-capitalized ones and the SMEs), existing scholarly debates (particularly those representing the culturalist perspective of ethnic Chinese business firms; see previous section) lead one to speculate that these firms have utilized their ethnic Chinese identity to tap into a cross-border ethnic Chinese business networks in their Vietnamese investments. This paper aims to investigate the validity of such a claim and its extent (if any), within the context of 46 Malaysian Chinese firms that have invested in Vietnam. Such a perspective is likely to yield useful insights on firm dynamics and investment strategies.

## 4. HYPOTHESES

This paper intends to extend the literature on the management methods of ethnic Chinese business firms by incorporating the firm-specific strategies and the broader institutional environment that the firms operate in, especially at a transnational level. It is hoped that such a perspective could explain the economic globalization interconnecting Malaysia and

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Vietnam, two of the world's faster-growing developing countries. To this end, the paper presents the following hypotheses to stimulate empirical investigation:

- Malaysian Chinese firms prefer to establish joint ventures in their investments into Vietnam because of a lack of familiarity with the investment climate, a lack of proficiency in the Vietnamese language, the state-enforced requirement of working with a Vietnamese partner in certain industries, and the potential benefits of collaborating with capable Vietnamese firms while minimizing financial risks
- Malaysian Chinese firms prefer to tap into the ethnic Chinese networks in their investments into Vietnam because of their familiarity with non-market mechanisms and their affinity to the sociocultural principles of a 'common' Chinese identity
- Malaysian Chinese firms are nonetheless sensitive to Vietnam's political economy as they are willing to collaborate with Vietnamese firms (in certain sectors) which enjoy a good relationship with the state, implying a flexibility to move away from the ethnic Chinese networks (when deemed necessary)

### 5. METHODOLOGY

This paper used a qualitative personal interview method to collect and analyse data on the strategies of Malaysian Chinese firms that have invested in Vietnam. In the preliminary selection, a list of 313 firms was compiled from the directory of the Malaysia Business Chamber Vietnam, various newspaper and magazine articles, the Internet, and through personal contacts. This preliminary selection took place from June to August 2012. From this list, only Malaysian firms that were owned and/or managed by the ethnic Chinese, and have made equity investment into Vietnam were selected and approached for further analysis.

In this paper, the Malaysian Chinese firms were divided into two broad categories: SMEs; and large firms. The paper used the latest definition from the SME Corporation Malaysia, a government body that acts as a central point of reference for information and advisory services for all Malaysian SMEs. Under this definition, a SME in the manufacturing sector is a company with sales turnover ranging from Malaysian Ringgit (MYR) 300,000 to MYR 50 million, or with number of employee ranging from five to 200. For a SME in the non-manufacturing sectors, a sales turnover ranging from MYR 300,000 to MYR 20 million, or with number of employee ranging from five to 75, is expected. Throughout the research, it became apparent that many of the firms surveyed were SMEs. A substantial portion of these SMEs were involved in manufacturing and non-manufacturing (namely trade, services, agriculture, property and construction, and finance) activities. On the other hand, the research uncovered a moderate number of large Chinese firms that have invested in Vietnam, with their sales turnover and employee strength greatly exceeding those of the SMEs. Almost all of these large and well-capitalized Chinese firms were publicly listed on the Kuala Lumpur Stock Exchange (KLSE).

136 firms were eventually identified and approached from August to October 2012. After multiple follow-ups, only 46 of these firms agreed to be interviewed. To this end, 38 of these firms were classified as Malaysian Chinese SMEs, and another eight were large Malaysian Chinese firms. The underrepresentation of large Chinese firms could be partly explained by their rigid protocols, especially when trade-specific information dissemination was involved. On the contrary, the SMEs were somewhat more open in granting interview sessions, especially when their owners and managers started to familiarize themselves with the researcher and the paper's research direction. The openness of the SMEs could also be partially explained by their shorter chain of command in their management structure vis-à-vis that of the (usually) larger and more organizationally complex non-SMEs. In-depth interviews with top executives of the 46 firms were subsequently conducted from October 2012 to February 2013. The perspective of top executives was important as they were often the

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decision makers when formulating company strategies, and were well-informed (albeit to a smaller degree) in the daily operations of their enterprises. These interview sessions were open-ended and semi-structured, with a focus on two main topics: (i) the modes of entry of their investments into Vietnam; and (ii) the main coalition partners of these firms in their investments into Vietnam. The goal of these interviews was to unpack the organization of Malaysian Chinese investments into Vietnam, particularly to determine their most favoured modes of entry (if any). It also investigated the relevance of intra-ethnic Chinese ties in orchestrating such cross-border ventures. Furthermore, it explored how and to what extent do intra-ethnic ties help in improving the opportunities and access to resources and market opportunities. The interview sessions were conducted in either the firms' headquarters in Malaysia, or their operations in Vietnam. During the interviews, a voice recorder was employed whenever possible, and only with the permission of the interviewees. Such an approach allowed unobstructed conversation between the researcher and the interviewees as the researcher was not required to write notes throughout the sessions. It also helped the researcher in capturing as much as possible the wealth of qualitative information (see Silverman, 1993).

To improve the reliability of the primary data provided by these firms, the data were cross-validated with published sources such as annual reports and company websites (if available), and non-published sources such as interviews with parties that were familiar with the operations of the firms involved e.g. trade officers, and the Chinese community associations of Malaysia and Vietnam. The use of these sources of information allowed for data verification and triangulation, which helped to improve data accuracy (see also Sim, 2009). Since several of the themes discussed, mainly ethnic relations and business-state interactions, are considered sensitive in Vietnam (and in Malaysia, albeit to a smaller extent), the interviewees were promised confidentiality. Therefore, this paper does not refer to any entities by their original names. The firms were categorized and numbered according to the economic sectors that they participated in, with clear labels signifying whether they were SMEs or otherwise (large Malaysian Chinese firms). The names of the owners and managers of the firms surveyed were also altered to protect their identity.

## 6. FINDINGS

### 6.1. Modes of entry of Malaysian Chinese firms investing into Vietnam

Three main modes of entry by Malaysian Chinese businessmen and firms are highlighted: (i) personal direct investments (wholly-owned); (ii) wholly-owned subsidiaries; and (iii) joint ventures. Table 3 shows the distribution of these modes of entry.

From Table 3, it is apparent that the majority of the firms (34 out of 46 or 74%) interviewed entered into joint ventures with other (usually Vietnamese) firms. Meanwhile, nine firms (20%) have established wholly-owned subsidiaries in Vietnam, and three ethnic Chinese businessmen (7%) have made personal direct investments (wholly owned). For personal direct investments, the owners of such businesses were relatively experienced in conducting business in Vietnam as they have invested into Vietnam a few years (through wholly-owned subsidiaries and joint ventures) before the personal direct investments were committed. In addition, these personal direct investments were very small in terms of capital outlay and labour force vis-à-vis their existing businesses. All three ethnic Chinese businessmen did not appear to show much interest in their personal direct investments, stating that 'my wife and their families and friends can take care of them' (personal communication, October 2, 2012).

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**Table 3: Modes of entry of Malaysian Chinese firms investing into Vietnam**

No	Comp any	Sector	Personal Direct Investments (Wholly-Owned)	Wholly-Owned Subsidiaries	Joint Ventures
1	T1	Trade	X		
2	T2	Trade			X
3	T3	Trade			X
4	T4	Trade			X
5	T5	Trade			X
6	T6	Trade	X		
7	T7	Trade			X
8	T8α	Trade			X
9	T9α	Trade		X	
10	S1	Services			X
11	S2	Services			X
12	S3	Services		X	
13	S4	Services	X		
14	S5	Services		X	
15	S6	Services		X	
16	S7	Services		X	
17	S8	Services			X
18	S9	Services			X
19	S10	Services			X
20	S11	Services			X
21	S12	Services			X
22	M1	Manufacturing			X
23	M2	Manufacturing			X
24	M3	Manufacturing		X	
25	M4	Manufacturing			X
26	M5	Manufacturing			X
27	M6	Manufacturing		X	
28	M7	Manufacturing			X
29	M8	Manufacturing			X
30	M9	Manufacturing			X
31	M10α	Manufacturing			X
32	M11α	Manufacturing			X
33	M12α	Manufacturing		X	
34	A1	Agriculture			X
35	A2	Agriculture			X
36	A3	Agriculture			X
37	A4	Agriculture			X
38	A5	Agriculture			X
39	A6	Agriculture			X
40	PC1	Property and Construction			X
41	PC2	Property and Construction			X
42	PC3	Property and Construction			X
43	PC4	Property and Construction			X
44	PC5α	Property and Construction			X
45	F1α	Finance			X
46	F2α	Finance		X	

**Note:** α indicates large Malaysian Chinese firms

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Across all economic sectors, joint venture investments have proven to be popular, with at least 50% of firms in each sector joining forces with other business entities in their business ventures. This was especially so in agriculture, and property and construction as all of the firms involved in both of these sectors have established joint ventures. In terms of modes of entry, there was no obvious difference between the SMEs and large firms as both groups favoured joint ventures over personal direct investments and wholly-owned subsidiaries in their investments into Vietnam.

### 6.2. Major coalition partners of Malaysian Chinese firms investing into Vietnam

Based on research and qualitative interviews, it was found that Malaysian Chinese firms cooperated with three major coalition partners when they invest into Vietnam: (i) ethnic Chinese networks; (ii) family; and (iii) others. Although many of the firms interviewed have made equity investments with their coalition partners through joint ventures, there were still some that relied only on their partners' advice or contacts. Such a strategy meant that they could still retain full equity ownership (and management control) of their Vietnamese investments. Table 4 shows the distribution of these firms' coalition partners. A significant portion (29 out of 46 or 63%) of the Malaysian Chinese firms preferred to employ ethnic Chinese networks in their Vietnamese investments. Meanwhile, a moderate level of family- or kin-based strategy was observed as five out of 46 firms (11%) operate in this manner. All of the firms that chose family members as coalition partners have relied on their (female and Vietnamese) spouses either directly or indirectly for such contacts. The remaining firms (12 out of 46 or 26%) opted for other types of partners, cooperating with either the governments of Malaysia and Vietnam, Vietnamese firms, international firms, or other Malaysian firms.

The reliance on ethnic Chinese networks is a common trend amongst the firms surveyed, with at least 67% of them employing such measures across all economic sectors, except in property and construction, and finance. In the property and construction, and finance sectors, all but one (86%) of the firms resorted to non-ethnic Chinese and non-family networks. More specifically, many of these firms cited the importance of joining forces with Vietnamese firms (especially a state-owned enterprise (SOE)) or people closely connected to the Vietnamese authorities. Between the SMEs and the large firms, there is a noticeable difference in their choice of coalition partners. In contrast to the SMEs which largely depended on ethnic Chinese networks, the large firms cooperated more frequently with non-ethnic Chinese and non-family networks.

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**Table 4: Major coalition partners of Malaysian Chinese firms investing into Vietnam**

No	Company	Sector	Ethnic Chinese Networks	Family	Others
1	T1	Trade		X	
2	T2	Trade	X		
3	T3	Trade	X		
4	T4	Trade	X		
5	T5	Trade	X		
6	T6	Trade		X	
7	T7	Trade	X		
8	T8 $\alpha$	Trade	X		
9	T9 $\alpha$	Trade			X
10	S1	Services	X		
11	S2	Services	X		
12	S3	Services		X	
13	S4	Services		X	
14	S5	Services	X		
15	S6	Services	X		
16	S7	Services	X		
17	S8	Services	X		
18	S9	Services	X		
19	S10	Services	X		
20	S11	Services	X		
21	S12	Services	X		
22	M1	Manufacturing	X		
23	M2	Manufacturing	X		
24	M3	Manufacturing	X		
25	M4	Manufacturing	X		
26	M5	Manufacturing			X
27	M6	Manufacturing			X
28	M7	Manufacturing	X		
29	M8	Manufacturing	X		
30	M9	Manufacturing	X		
31	M10 $\alpha$	Manufacturing			X
32	M11 $\alpha$	Manufacturing	X		
33	M12 $\alpha$	Manufacturing			X
34	A1	Agriculture	X		
35	A2	Agriculture	X		
36	A3	Agriculture			X
37	A4	Agriculture		X	
38	A5	Agriculture	X		
39	A6	Agriculture	X		
40	PC1	Property and Construction	X		
41	PC2	Property and Construction			X
42	PC3	Property and Construction			X
43	PC4	Property and Construction			X
44	PC5 $\alpha$	Property and Construction			X
45	F1 $\alpha$	Finance			X
46	F2 $\alpha$	Finance			X

**Note:**  $\alpha$  indicates large Malaysian Chinese firms

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## 7. DISCUSSION

The findings of this paper highlight a few salient points. Firstly, joint venture investments were the most favoured mode of entry for the Malaysian Chinese firms. Many of these firms revealed that it was pragmatic for them to form joint ventures because they were not entirely familiar with the rules and regulations of Vietnam and the respective sectors that they were involved in. For instance, many of the firms surveyed were particularly confused by the Vietnamese land ownership system. This unfamiliarity with local regulation was also exacerbated by their incompetence in the Vietnamese language, although many of them mentioned that 'the Vietnamese custom and way of life are very similar to those of the ethnic Chinese' (personal communication, December 15, 2012). Furthermore, many of them argued that Vietnam's restrictions on certain economic sectors meant that it was not possible to set up a Vietnamese operation without local equity investment. All of these perspectives reflect the generally challenging business environment of Vietnam as the Communist country only liberalized its economy in 1986, and this and further rounds of post-1986 liberalization efforts were mostly implemented in a piecemeal manner (see Rana, 1995; Ishida and Fujita, 2010). The inertia of Vietnam's centrally planned economy is still prevalent although it officially joined the World Trade Organization (WTO) in 2007. To the Vietnamese government's credit, it has indeed implemented many of the liberalization measures stipulated by the WTO, yet it must be noted that some of the measures have been staggered over the short to medium term to provide ample time for firms and individuals to adjust to the new measures (Quang Tran, 2008). Nonetheless, there were genuine benefits in establishing joint ventures. As the managing director of M4 revealed:

'It is not cheap to set up a manufacturing plant, even one as small as mine. There are a lot of risks involved because many people can also produce the same things that my factory produces. So, if you can get someone to split the risks and costs, then why not?' (personal communication, December 3, 2012)

Others emphasized that a joint venture involving a good and trustworthy partner was important because it was one of the quickest and most certain way of gaining access to local insights pertaining to the Vietnamese market. Several interviewees concurred with this point, explaining that their joint ventures were partially aimed at co-opting potential business rivals: 'The local businessmen are like the *di tou she* (the literal meaning is local snakes; a Chinese business term to describe capable local businessmen, usually with good connections), so better to be on their side than to fight them directly' (personal communication, December 15, 2012).

Secondly, the experience of the three businessmen (owners of T1, T6, and S4) who have made personal direct investments in Vietnam is perhaps an unintended outcome of the broader socioeconomic trend accompanying the large volume of outward FDI from Malaysia into Vietnam. As these three businessmen had been living in Vietnam for a number of years, they were able to blend in with the broader Vietnamese populace. For the business owners of T1 and T6, they both married Vietnamese wives who used to work for them in their other businesses. After a few years of marriage and success in their businesses – with their wives playing a strong supporting role – both T1 and T6 decided to reinvest their earnings by starting up new firms in Vietnam. However, they were content to let their wives manage these new firms on their behalf (personal communication, December 18, 2012). On the other hand, Yip (the owner of firm S4) had a slightly different story compared to the business owners of T1 and T6. Yip had met his wife in 2006 through a matchmaking agency when he was still running his business in Malaysia. According to Yip, their marriage was a happy one, and his wife proved to be an excellent manager. When Yip wanted to expand his business into Vietnam in 2008, his wife was astute enough to help him do so. As Yip's business flourished in Vietnam, he was glad to pamper his wife by investing in a small photocopying shop and letting his wife take charge of the shop (personal communication, December 16, 2012). To this end, all three businessmen were satisfied to take a passive role in these



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personal direct investments as they agreed that '*fei shui bu liu ta ren tian*' (money is better kept in the family than to outsiders) and the financial commitments of these personal direct investments were relatively small compared to their regular businesses (personal communication, December 16, 2012). Shaped by their business success, all three businessmen were unanimous in their positive perception of their spouses (and Vietnamese women in general), claiming that they are 'very smart', and 'very similar to our Chinese culture' and 'can learn to speak Mandarin very quickly' (personal communication, December 16, 2012). As evidenced by the preceding paragraph, these three businessmen were not the only ones who claimed that there was some similarity between the Chinese and the Vietnamese culture. Although they do not represent the majority of the firms surveyed in this paper, it is likely that such investments would intensify in the future, in view of the likelihood of continued outward FDI (at least in the short to medium term) from Malaysian Chinese firms entering Vietnam, and the growing number of Malaysian Chinese men marrying Vietnamese women through matchmaking agencies, as noted in "Viet Brides Hot Commodities" (*AsiaOne*, 22 November, 2011).

Thirdly, a significant portion (63%) of the Malaysian Chinese firms relied on ethnic Chinese networks in their Vietnamese investments. Such a high incidence of intra-ethnic cooperation seems to support the culturalist school of thought on ethnic Chinese business firms, particularly if one considers the minority status of both the Malaysian Chinese (about 25% of Malaysia's population) and the Vietnamese Chinese (about 1.5% of Vietnam's population). This is evident in all the economic sectors surveyed, barring the property and construction, and finance sectors. Many of these firms cited their positive experience in dealing with the Vietnamese Chinese business community. To this end, these firms draw on the wider Chinese business practise and tradition in which *xinyong* (trust) and *guanxi* feature prominently in business dealings with their counterparts. Some firms exemplify such a situation as they claimed that portions of their business arrangements were often agreed upon over the telephone and emails without the use of formal contracts. As the manager of A5 explained:

'Chinese people usually keep their promises well, and that's the same for the Vietnamese Chinese. If you insist on contracts, people may get offended because your actions show that you are suspicious of him or her.... So, you cannot build good *guanxi* with them without having *xinyong*. So far, there are no problems with this arrangement. Our joint venture is doing well' (personal communication, December 20, 2012)

However, many of the firms revealed that this does not negate the need for formal contracts. More precisely, it was impractical to have written agreements for every detail that they discuss with their Vietnamese counterparts. The managing director of S9 revealed that the master contract was the 'cornerstone' of his firm's investment in Vietnam, but the more tacit components would require the mutual *xinyong* between his company and his Vietnamese Chinese business partner (personal communication, January 10, 2013). He shared the following:

'Ideally, I would want our restaurant manager to speak Mandarin and one other Chinese dialect. But, my Vietnamese business partner is not too concerned on this. This puts me in an awkward position. The problem is that hiring matters are not stated in the contract, and it would be difficult to put this clause into the joint venture agreement. The agreement can only cover the big issues like how much both sides invest, who gets to be the director, dividend policy... Hiring matters are not too important compared to those big issues. It is also difficult for me, as a non-Vietnamese, to screen all the job applicants... so better to trust the Vietnamese on this. The world's best contract cannot really cover you all the time if you don't have a good trusting relationship' (personal communication, January 10, 2013)

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To this end, these cross-country Chinese business networks are similar to what Lindahl and Thomsen (2002) discovered in their research on the intra-ethnic cooperation undergirding the Vietnamese Chinese textile firms and their Taiwanese (ethnic Chinese) partners. The findings of this paper underline the reliance on informal and ad hoc agreements, and the tendency for Malaysian Chinese firms to evoke (real or imaginary) their ethnicity and associated Chinese business ideals such as *guanxi* and *xinyong* in their investments in Vietnam.

Despite the high incidence of joint ventures and the reliance on ethnic Chinese networks by the Malaysian Chinese firms, a careful analysis of Vietnam's political economy is much warranted. Such a perspective sheds light on some of the less obvious, yet vital, findings of this paper. More specifically for the firms in the property and construction, and finance sectors, their choice of coalition partners is more context-specific as 86% of these firms have neither depended on the ethnic Chinese networks nor family members. In the property and construction sector, the Malaysian Chinese firms' tendency to cooperate with non-Chinese firms and non-family members can be explained by examining Vietnam's land use policy. In Vietnam, the government's Communist nature means that it does not recognise private ownership of land by individuals and organisations. Therefore, firms involved in the property and construction sector have to first obtain land-use rights (LUR) before commencing work. The LUR is in turn granted by way of land allocation or lease from the government. In addition, the type of LUR granted by the state depends on whether the land user is a Vietnamese or a foreign firm. If the land user is Vietnamese, the LUR may be granted either by way of allocation or lease. A foreign firm may acquire LUR *only* in the form of a lease (save in the case of a LUR being contributed as capital by a Vietnamese firm in the formation of a joint venture firm) (Rodl and Partner, 2013, p.113). Furthermore, the allocation of land to a Vietnamese land user can be, depending on the intended use of the land, on a 'stable and long term basis' or for a definite term. Land lease is always for a definite term only. In contrast, a foreign developer can obtain a land lease *only* for the duration of the investment project (with a maximum duration of only 50 years) (Rodl and Partner, 2013, p.113). Therefore, foreign firms (including the Malaysian Chinese ones) involved in the property and construction sector are effectively 'incentivized' to establish joint ventures with Vietnamese firms, particularly SOEs, in order to obtain the appropriate types of LUR.

Yet, one wonders why the ethnic Chinese of Vietnam have not been as proactive in acquiring the LUR as other Vietnamese firms such as the SOEs. It is after all reasonable to expect them to be as prolific in the property and construction sector, given their general strength in the overall economy, and the overseas Chinese business networks that they can tap into. As Thomsen's (2011) research illustrates, Vietnam's anti-capitalist measures after its reunification in 1975 had diminished the socioeconomic influence of the country's ethnic Chinese populace, many of whom were already successful in the business arena before the fall of the South Vietnamese regime. To this end, all property owned by the ethnic Chinese was nationalized and their social and cultural activities were also banned (Amer, 1996; Lindahl and Thomsen, 2002). While the Vietnamese government emphasized that such policies were designed to rein in capitalist activities rather than those of the ethnic Chinese, the effects of the policies fell disproportionately on the Vietnamese Chinese populace because of their economic success (Rigg, 2003). State policies towards the ethnic Chinese were intensified in 1978-1979. In 1978, the ethnic Chinese were expelled from the Communist party and from all positions deemed sensitive to national security. Furthermore, the state also organized departure programs for the ethnic Chinese. The 1979 Chinese invasion of Vietnam's northern borders exacerbated the situation, much to the detriment of the Vietnamese Chinese (Rigg, 2003). All of these events culminated in the mass exodus of refugees from Vietnam, with the ethnic Chinese again being overrepresented in this group (Tran, 1993). With the departure of many of the ethnic Chinese merchants and the subsequent strengthening of a centrally planned economy throughout the country, the factors of production (particularly land and capital) were effectively transferred from the private

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sector (in which the Vietnamese Chinese used to dominate and still do, albeit to a smaller extent) to the SOEs or groups aligned with the victorious North Vietnamese regime (see also Tran, 1993; Amer, 1996). The anti-capitalist measures worsened the economic situation of Vietnam, and the ensuing desperation forced the Vietnamese government to undertake economic reform, which gradually pushed Vietnam to implement the 1986 *doi moi* reform package (Freeman, 1996; Ishida and Fujita, 2010). Since then, the fortunes of the Vietnamese Chinese community (along with that of Vietnam) have been revived, particularly in the SME and trading sector in which their linkages with the overseas Chinese business community confer them with a competitive advantage. Nevertheless, it could also be argued that the ethnic Chinese have not been able to regain its former dominance in the Vietnamese economy. Thomsen (2011) specifically shows that the allocation of factors of production to private firms is still predominantly state-driven and personalized in Vietnam. She further asserts that the firms who are worst off in this respect are those owned by the Vietnamese Chinese, who have minimal access to factors of production (especially land in the form of LUR) because of a series of anti-capitalist (and by extension, anti-Chinese) events that had befallen them post-reunification. Their opportunities are far less limited vis-à-vis those who enjoy a good relationship with the state, especially the SOEs and parties friendly to them (see also Thomsen, 2009). Under such conditions, it is only natural for the Malaysian Chinese property and construction firms to collaborate with these 'more connected' Vietnamese entities, rather than Vietnam's ethnic Chinese firms.

A similar story is also observed in the choice of coalition partners of Malaysian Chinese firms that have invested in the Vietnamese financial sector. Toby, a manager of F1α, revealed that his firm had entered into a 50:50 joint venture with one of Vietnam's SOEs in the 1990s (personal communication, January 10, 2013). According to him, F1α had been actively scouting for an ethnic Chinese firm to cooperate with initially. However, due to multiple issues at that time, an agreement could not be reached between firm F1α and any of the financial firms owned by the Vietnamese Chinese. One of the most pressing issues was that F1α had received some tacit notification from the consultants that F1α hired, who stated that it was in the firm's interest to cooperate with a certain SOE. Toby also revealed that the consultants had direct contact with 'some influential people' and it was conceivable that covert 'encouragement' had been applied in influencing F1α's choice of a joint venture partner.

## 8. CONCLUSION AND POLICY IMPLICATIONS

This paper has analysed the modes of entry of 46 Malaysian Chinese firms that have invested into Vietnam and their major coalition partners in such cross-border investments. It has argued that the majority of these firms preferred forming joint ventures in their Vietnamese investments. There were multiple reasons for the establishment of joint ventures. Chief among them were the lack of familiarity with the investment climate of Vietnam, the lack of proficiency in the Vietnamese language, state-enforced requirement of working with a Vietnamese partner in certain industries, minimization of financial risks, and potential benefits of cooperating with capable Vietnamese firms.

In terms of coalition partners, there is a tendency for the Malaysian Chinese firms to collaborate with the ethnic Chinese of Vietnam, implying a reliance on non-market mechanisms (in the form of *guanxi* and *xinyong*) and the sociocultural principles of a 'common' Chinese identity. These connections are often embedded in personal relationships between the owners and managers of the Malaysian Chinese firms and their Vietnamese counterparts. In some cases, there has also been a deepening of these intra-ethnic ties, particularly when the Malaysian Chinese firm owners marry their female Vietnamese employees, incorporating their Vietnamese wives and their broader family into an 'enlarged' Chinese family firm. Such findings prove that the culturalist perspective studying the management models of the ethnic Chinese firms still produces valid but partial truths.

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Nevertheless, the influence of political considerations cannot be overlooked. As the institutional theorists have argued, a country's socio-political institutions are able to influence firm dynamics and their investment strategies. More specifically, an in-depth examination of the Malaysian Chinese firms involved in the property and construction, and finance sectors suggests that they have not relied on the ethnic Chinese business networks and their family members. Instead, their coalition partners are those who enjoy a good relationship with the Vietnamese state, particularly the SOEs and parties affiliated to them. Such a finding is anomalous compared to the widespread employment of ethnic Chinese business networks in the trade, services, manufacturing, and agriculture sectors. A plausible explanation of this anomaly is the Vietnamese Chinese firms' lack of good connections with the authorities. The lack of good connections could in turn be explained by the anti-capitalist (and anti-Chinese?) campaigns in the post-reunification period which negatively affected the Vietnamese Chinese, especially the business community. With their assets nationalized and sociocultural activities curtailed, a substantial portion of the Vietnamese Chinese fled the country. Although the 1986 *doi moi* reform had helped in reviving the fortunes of the Vietnamese Chinese community, they were still largely secluded from accessing crucial factors of production (especially land in the form of LUR). Furthermore, the opaque manner in which the Vietnamese state distributes these resources puts the Vietnamese Chinese firms at a disadvantage vis-à-vis those possessing close and personalized relationship with the state apparatus.

What then are the policy implications of this paper? Firstly, FDI from developing countries such as Malaysia can be as important as, if not more than, that from the 'traditional' developed countries e.g. the Western bloc and Japan. Hence, policy makers should not solely target outward FDI from the 'traditional' developed countries. Vietnam best exemplifies this situation as its top five investors (in terms of FDI stock) all originate from the Asian newly industrialized economies (barring Japan which is ranked fourth). As Yeung (2007) makes clear, many of the firms from these Asian economies are playing an increasingly vital role in the global economy. Their ability to capitalize on the intimate knowledge of the local and regional market place through the region-wide Chinese business networks is a particularly inimitable competitive advantage. In addition, these Asian firms are more likely than Western firms to embed their operations in specific localities through their relationship with the local business community (Fong, 1990; Yeung, 1998). More specifically, this paper has revealed that some of the owners of the Malaysian Chinese firms have embedded and sunk roots in Vietnam through the marriage of their Vietnamese employees. The subsequent incorporation of their Vietnamese spouses (and their extended family) into an 'enlarged' transnational Chinese firm further solidifies their socioeconomic ties. Their willingness to embed has important implications for the transfer of technology and management expertise to the FDI recipient country (in this case, it is Vietnam) (see O'Brien, 1993; Yeung, 1998).

Related to the above point is the argument that ethnic- and family-based business networks are not necessarily counterproductive to economic development (cf. Backman, 2001). To this end, this paper has illustrated that the Malaysian Chinese firms and their ethnic Chinese business networks are a useful conduit integrating both the Malaysian and Vietnamese economies. Although the Malaysian Chinese firms and their Vietnamese partners (not necessarily those of ethnic Chinese origins) may lack the resources of other better-endowed firms e.g. Vietnam's SOEs, their nimble and on-the-ground approach, complemented by the deep entrepreneurial support from the Chinese business networks, contributes to local economic development. Hence, Vietnam stands to benefit from these cross-border ethnic Chinese business networks. The investments of the Malaysian Chinese firms are particularly useful for the Vietnamese state as it seeks to reduce its dependence on its SOEs, and to provide the economy with some balance and flexibility in an unpredictable global economy.

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# ECONOMIC TRANSFORMATION AND SOCIAL INEQUALITY IN EURASIAN COUNTRIES

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**Abstract:** Patterns of income distribution and social structure place certain constraints on any country's economic development. Economic growth also causes changes in social structures but rather differently depending on a country's level of development. On the one hand, Eurasia includes industrially developed countries with a comparatively high-income level and mature civil society but currently experiencing very slow recovering from the economic crisis. On the other hand, there are emerging Asian countries with a considerable share of poor people and lack of democracy but showing fast economic growth and rising global influence. In terms of growth and inequality Eurasian countries are as different as all the countries together. This paper compares correlations between economic progress and inequality of 55 countries in 1992-2010 both in general and by income groups. It shows that as a part of middle (and low) income trap social inequality changes go quite slow for fast growing countries. Consequently, success of development and achieving social stability will need comprehensive economic policy, not just GDP growth.

**Keywords:** Economic Growth, Income Inequality, Eurasia

## 1. INTRODUCTION

In order to analyse global economic and political problems of the 21st century (poverty, migration, growing energy consumption, etc.) it is very important to understand our modern society structure, countries' specifics in inequality and their transformations. Although in 2011 developing countries became equal to the developed ones by absolute GDP, their productivity, technological progress and life quality levels are still significantly different. Two latest decades showed some new trends in social structures change: fast middle class formation in most developing countries, transformation of former socialistic countries communities and drastically deepening inequality while improving the overall level of economic development.

The biggest economies in terms of absolute GDP are totally different both by GDP per capita and by social structure (Table 1). For example in Japan, the richest own 5 times more of income than the poorest and in South Africa this number is 50 times more.

There are many studies focused on the influence of institutions quality (EBRD, 2013), democracy (Barro, 1997), (Olson, 1993), inequality (Simoes *et al.* 2012) and other society



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peculiarities on economic growth. On the contrary, in this paper we examine the influence of economic development (presented as GDP per capita growth) on inequality (measured as income share by top 10% – hereinafter IS10).

OECD 1998 report revealed that between the mid-1970s and the mid-1990s in high income countries (with few exceptions) inequality (measured by the Gini coefficient; the squared coefficient of variation; the mean-log deviation and the Atkinson index was growing. The governments tended to enlarge taxes and transfers system and transform it into a more redistributive one (OECD, 1998). As a result elderly people benefited from this transformation while families headed by young adults have suffered losses. In analogous study of 2011 OECD again stated the increase in inequality in most of its member-countries (OECD, 2011). The report explains growing income inequality mostly through changes in wages and salaries distribution. Using wide range of statistical indicators OECD researchers state more rapid growth in gap between the top and the middle than in gap between the middle and the bottom. They also prove a rise in top income recipients share among all the member-countries, especially in United States.

**Table 1: Economic and social indicators for the biggest economies**

Country	Year	Gini ratio	GDP PPP per capita 2010, thousand 2005 \$	Income shares by top and bottom deciles in total income, %	
				bottom 10%	top 10%
India	2005	33	3.1	3.7	29
China	2009	42	6.8	1.7	30
South Africa	2009	63	9.5	1.2	52
Brazil	2009	55	10.1	0.8	43
Russia	2009	40	14.2	2.8	32
Japan	2010	34	31	4.8	26
Germany	2010	29	33.5	3.2	23
USA	2010	38	44	1.9	30

**Source:** World Bank

Moreover, the problem of growing inequality in US was mentioned in the recent Report of the President (The Economic Report of the President, 2013, pp. 60-61, Box 2-2). According to the report, inequality has been growing for the past 30 years and besides causing social instability, affects aggregate demand as in the short run top income recipients spend smaller share of their earnings on consumption. Due to data missing, US were excluded from our analysis, but above mentioned papers help to adjust the global picture.

There are fewer papers on global not regional income distribution trends. One of the latest UNU-IHDP and UNEP report mentions growing inequality not only in OECD countries but also all over the world and sees main obstacles to social stability in boosting consumerism short-term political strategies, growing population and correspondingly rising natural resources use (UNU-IHDP and UNEP, 2012).

One of the most famous works on global inequality written by Simon Kuznets in 1955 states that the connection between GDP per capita and inequality has inverted-V-shape, i.e. inequality grows at the early stage of development till certain point and then starts to fall. Afterwards there were many researches based on different periods and countries confirming or refuting Kuznets curve existence. Our research shows more complex relations between economic progress and inequality change than Kuznets curve but also has proved that for middle-income countries it is difficult to switch from inequality growth to its fall.

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Grigoryev and Parshina (2013) recent study was focused on the cluster analysis of 150 countries by GDP per capita groups (Table 2). It showed that in absolute terms clusters moved away from each other but comparatively they got closer. The study also revealed the decrease in the number of top cluster countries. We used these borders to set up new clusters for this inequality research.

**Table 2: Countries clusters by GDP per capita in 1992 and 2010**

Cluster	Fixed borders and countries groups				Shifted borders (reflecting 45% global GDP per capita growth)		
	Cluster borders by 1992, thousand \$	Number of countries	Average GDP PPP per capita		Cluster borders in 2010, thousand \$	Number of countries	Average GDP PPP per capita 2010
			1992	2010			
1	> 25	15	31.8	39.8	> 36.305	9	47.3
2	15.001 – 25	15	21.3	30.7	21.784 – 36.304	24	29.6
3	10.001 - 15	11	12.2	19.0	14.523 – 21.782	8	18.1
4	5.001 – 10	30	7.2	11.6	7.262 – 14.522	34	10.9
5	2.251 - 5	27	3.4	5.5	3.269 – 7.261	27	4.9
6	1.251 – 2.25	20	1.7	2.9	1.817 – 3.267	17	2.4
7	< 1.25	32	0.8	1.2	< 1.815	31	1.1

**Source:** Grigoryev and Parshina (2013)

## 2. DATA AND INDICATORS

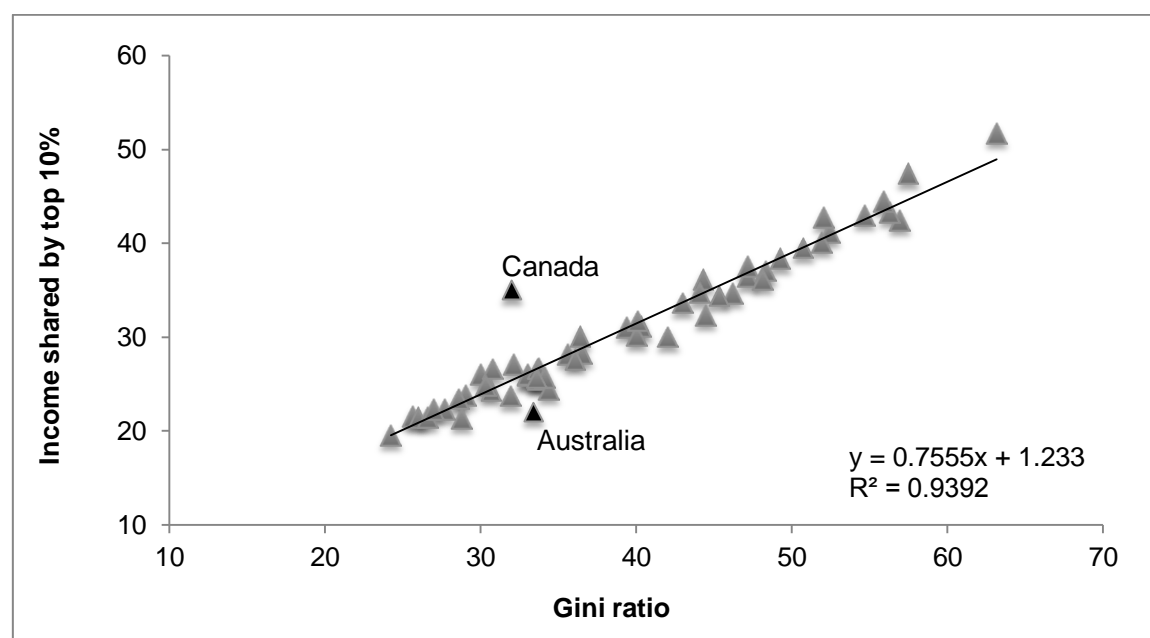
As mentioned above, we based this research on studies in the fields of macroeconomics, institutional economics, sociology, etc. It analyses the impact of economic progress on social structures of different countries. We used data on GDP per capita growth as economic development indicator and income share held by highest 10% or top decile as an indicator of inequality. There are several reasons for these factors have been chosen for the study. GDP per capita is a common measure of economic progress and will be used here due to its meaning and the availability of trustworthy data. Prevailing measure of inequality is Gini ratio, however, even World Bank warns against overestimating this indicator while analyzing inequality. Top income recipients share in total earnings seems to better indicate inequality situation and is also widely used in analyzing countries' economic and social problems (Roine and Waldenstrom, 2010). Atkinson (2013) states that rise in inequality can be described as "upper part of the earnings distribution has been racing away". In our opinion this indicator reflects how concentrated is the allocation of resources and where the immediate results of economic growth go. Consequently, if this share stays high and stable this society doesn't change and progress much despite GDP per capita growth. Undoubtedly this indicator has very strong positive correlation with Gini ratio – and our data also proved it. Moreover, both of them seem to have quite high negative correlation with GDP per capita growth (Table 3).

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**Table 3: Correlations between GDP per capita, income share by top 10% and Gini ratio**

	Gini 1992	Gini 2000	Gini 2010	IS10 1992	IS10 2000	IS10 2010
GDP 1992	-0.50			-0.50		
GDP 2000		-0.52			-0.54	
GDP 2010			-0.47			-0.46
Gini 1992				0.97		
Gini 2000					0.97	
Gini 2010						0.97

However, for some countries Gini ratio in comparison with income share by the richest shows some deviations that may be treated as inequality under- or overestimation (Figure 1). For the selected countries the biggest underestimation can be observed for Canada, Pakistan and Egypt. For other countries like Australia, Spain, China Gini ratio, on the contrary, overestimate inequality. The bigger income share of the 10th decile is – the less is left for any type of distribution for the nine other deciles (in most cases with 9th decile taking around 15% of income) (Grigoryev and Salmina, 2011).



**Figure 1: Gini ratio vs. Income share by top 10%**

The period under analysis is 1992 to 2010 as it is a period of sustainable and high growth in many countries, 45% increase in global GDP per capita. We divide this period into two: 1992-2000 and 2000-2010 with respective growth of 16% and 25%. It is important to remember for countries in transition, especially former Soviet Union ones, that contrary to the global trend of 1992-2000 they suffered GDP decrease. As the analysis has shown, in terms of inequality changes these two periods are rather different. Appropriate data is available for 55 countries (Gini ratio is available for 74 countries) from World Bank, OECD, Eurostat and national statistics of Canada and Japan (Appendix, Table A1).

As the selected countries differ significantly in terms of income, economic structure, national specifics we also analyzed them separately within three groups: 1992 level of GDP PPP per capita lower than 4 thousand dollars 2005 constant prices, between 4 and 17 thousand, more than 17 thousand. Such group borders allow these countries to stay within the same group in terms of both fixed and flexible clusters (Grigoryev and Parshina, 2013). The first group (low-income countries in this paper) includes 17 countries, the second one (middle-income countries in this paper) – 23 and the third group (high-income countries in this paper)

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includes 15 countries (Appendix, Table A1). Together they represent all the continents and stages of development; therefore their trends in equality (or inequality) can reflect global trends.

Our initial hypothesis was “Economic growth helps to decrease inequality”, however; the research outcome is rather vague. This work still leaves several important questions for further studies.

## 3. GLOBAL TRENDS IN INEQUALITY

### 3.1 General Trends

Over a period between 1992 and 2010 two different prevailing trends in inequality level in the selected countries could be observed:

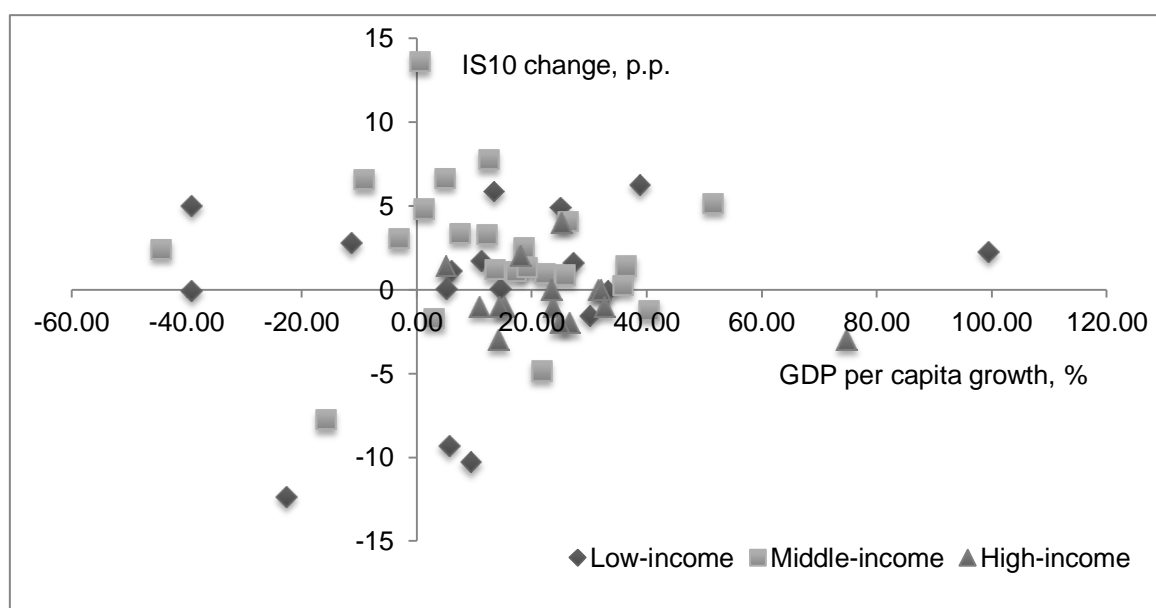
- Leveling or growth of inequality: measured by Gini ratio – 19 from 74 countries; measured by income share by top 10% – 11 from 55 countries (UK, Finland, Canada, China, Indonesia, Japan, Uruguay, Honduras, Costa-Rika, Zambia, Poland);
- Inequality increase in 1992-2000 and decrease in 2000-2010 resulted in lower Gini ratio – 22 from 74 countries in 2010 in comparison with 1992 and lower income share by top 10% – 12 from 55 countries (Philippines, Argentina, Romania, Egypt, Malaysia, Turkey, Chili, Mexico, Tunisia, Panama, Turkey, Pakistan).

Basically, in 1992-2010 half of the countries has shown increase in inequality, while the other half has shown a decrease. In 1992-2000 inequality (IS10) in most countries stayed the same or rose (36 from 55). On the contrary, in 2000-2010 inequality in most countries reduced (32 from 55). Maximum, minimum, average and median income share by top 10% was higher in 2000 than in 1992, and also higher (except maximum) than in 2010 (Table 4). It is difficult to make conclusion based on aggregated and averaged data, thence we divide countries into income clusters and include separate analysis of the two periods.

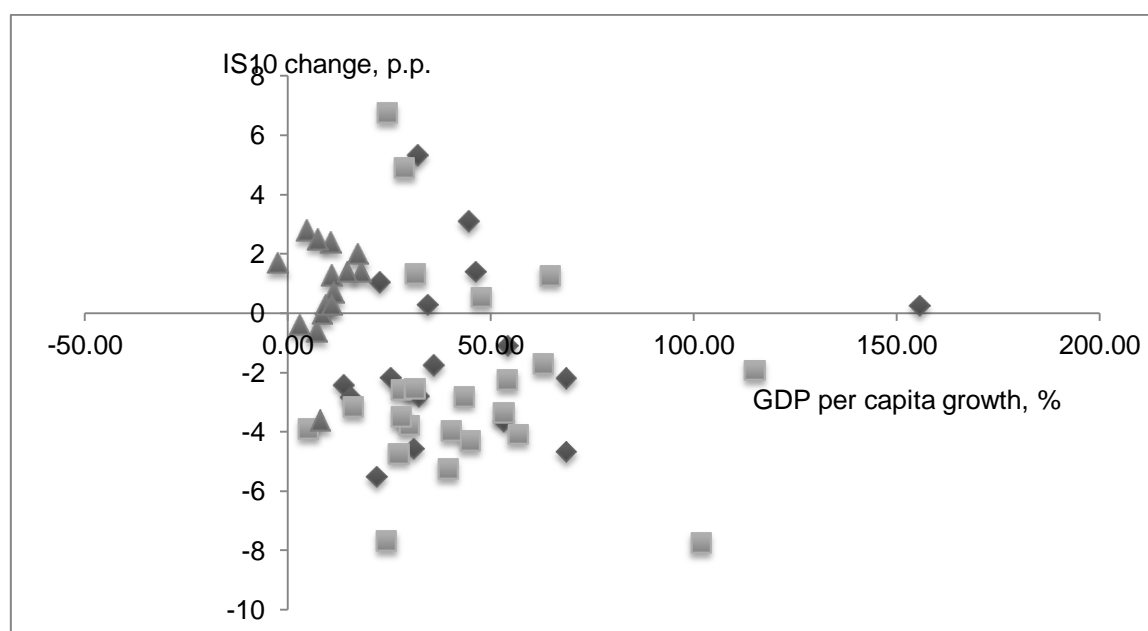
**Table 4: Gini coefficient and income share by top 10% in 1992, 2000 and 2010**

	Gini coefficient (74 countries)			Income share by top 10% (55 countries)		
	1992	2000	2010	1992	2000	2010
Maximum	59.3 (South Africa)	62.8 (Bolivia)	63.1 (South Africa)	46.7 (South Africa)	48.8 (Bolivia)	51.7 (South Africa)
Minimum	20.9 (Sweden)	22.7 (Denmark)	24.2 (Romania)	19.4 (Belarus)	20 (Finland)	19.5 (Romania)
Average	37.7	38.9	37.8	31.4	32.2	31
Median	34.7	35.8	35.6	30.7	31.5	30
Standard deviation	10.6	10.4	9.4	8.1	8.4	7.8

Distributions of GDP per capita growth and change in inequality during two periods show the same tendency (Figure 2 and Figure 3). Obviously, 1992-2000 can be described as increase and 2000-2010 as decrease in inequality, especially at higher levels of GDP growth. However, the picture is slightly different for different income groupings.



**Figure 2: GDP per capita and IS10 change 1992-2000**



**Figure 3: GDP per capita and IS10 change 2000-2010**

### 3.2. Trends by Income Groups

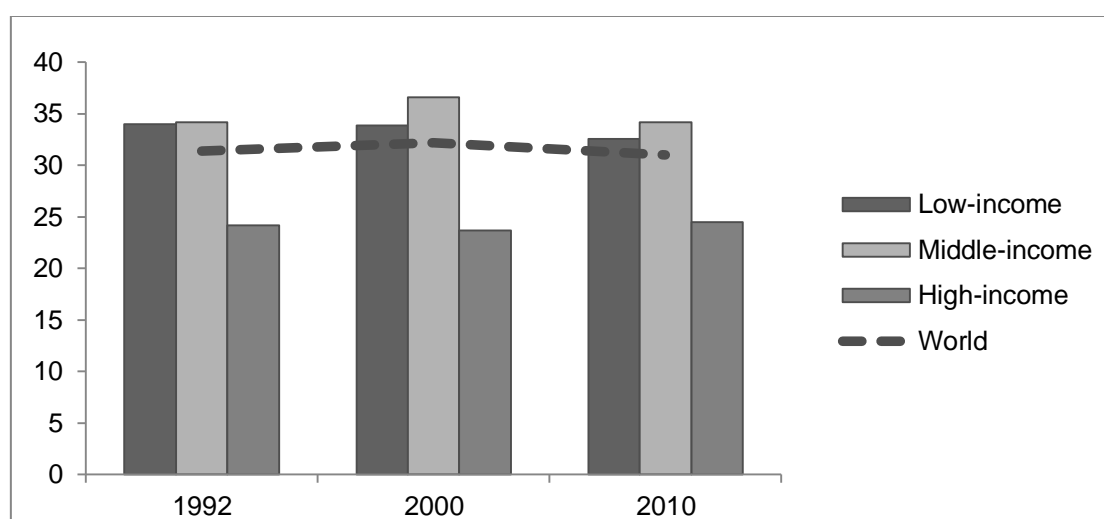
The global tendency of growing in 1992-2000 and falling in 2000-2010 inequality level can be also observed from the groups of countries data (Table 5). Corresponding with Kuznets concept, high-income countries do have lower inequality than others – around 24% of total income is held by 10th decile, however, there is no big difference between middle-income or and low-income countries – average number here is around 35%. Thus we can confirm the existence of low and middle-income traps that make socio-economic progress rather hard from a certain income level without comprehensive institutional changes. Growth is not making the progress by itself.

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**Table 5: Income share by top 10% in the three groups of countries**

Income share by top 10%		GDP PPP per capita, thousand dollars 2005 constant prices		
		<4	4-17	>17
Average	1992	34.0	34.2	24.2
	2000	33.9	36.6	23.7
	2010	32.6	34.2	24.5
Median	1992	34.8	34.3	23.0
	2000	33.5	37.5	23.0
	2010	30.0	34.7	24.3
Standard deviation	1992	7.3	8.3	2.7
	2000	6.4	7.8	3.7
	2010	6.7	8.2	3.4
Number of countries		17	23	15

Figure 4 shows that middle-income countries in 1992-2000 experienced such a sharp increase in inequality so now their situation is even worse than in low-income countries in these terms. High-income countries income share by the richest was staying more or less stable.



**Figure 4: Income share by top 10% by GDP per capita groups of countries**

## 4. REGRESSION ANALYSIS

Insufficient data (only 55 countries) makes econometric analysis quite hard to conduct, however, there are few statistically seen correlations. Logarithmic regression for 2000-2010 shows that income share by top decile in that period had -0,15 GDP per capita elasticity, in other words, 1% of GDP per capita growth within the period on average has led to 0,15% decrease in inequality:

$$LN(IS10/2010) = 0.88 * LN(IS10/2000) - 0.15 * LN(GDP/2000-2010) + 0.40 \quad (1)$$

$$R^2 = 0.88$$

Thus we can prove our initial hypothesis. But the period of 1992-2000 doesn't show any good statistical results (Table 6).

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**Table 6: Regression analysis results by two periods**

	Coefficient before GDP growth	p-value
1992-2000	0.016	0.846
2000-2010	0.150	0.020

Econometric analysis by groups is even more problematic as there are not enough observations. There are only two comparatively significant tendencies – negative correlation between GDP per capita growth and inequality change for middle-income countries in 2000-2010 and high-income countries in 1992-2000 (Table 7).

**Table 7: Regression analysis results by groups and two periods**

	Low-income countries		Middle-income countries		High-income countries	
	Coefficient before GDP growth	p-value	Coefficient before GDP growth	p-value	Coefficient before GDP growth	p-value
1992-2000	0.038	0.758	0.058	0.632	-0.241	0.176
2000-2010	0.037	0.772	-0.157	0.182	0.015	0.965

However, comparing Figure 2 and Figure 3 and these regression results one may see that even insignificant coefficients show at least correct signs vis-a-vis GDP per capita growth.

### 5. EURASIA CASE

For this study the Eurasia region is considered to be a very interesting case. 31 of the 55 selected states are Eurasian: 8 low-income, 9 middle-income and 14 high-income countries. Considering other Eurasian countries excluded from statistical analysis, in socio-economic terms this region can be divided into three big groups: the first is Old Europe and Developed Asia with high GDP per capita and low inequality, the second is Post-communist Europe and Asia with low GDP per capita and low inequality and the third is Developing Asia with low GDP per capita and high inequality (Appendix, Table A2). There are few exceptions like Russia – post-communist country but with rather high inequality or Pakistan – developing Asian country but with rather low inequality.

In the recent years these three groups have become little closer by GDP per capita. However, the difference is still considerable, especially in terms of social structure. OECD countries are still recovering from the global economic crisis, their growth is slow and unstable, while their inequality levels stay low, they didn't seem to decrease anymore. Developing countries, although having inequality level higher than OECD neighbours, made certain progress in one or both of the chosen periods. Their income inequality can be explained through economic restructuring and can't be referred to national specific as in Latin America.

Under the given period countries from the first group moved the same path as high-income countries described before. The second group (transition countries) was able to reduce inequality even more to the level of the first group (Figure 5). But it must be taken into account that several of these countries in 1990s (contrary to the global tendency) suffered GDP per capita fall. For example, between 1992 and 2000 Russia and Kyrgyz Republic both lost around 20% of GDP per capita and decreased income share of top decile by 8 and 12 percentage points respectively. Moldova and Kazakhstan in their turn while suffering GDP per capita fall had a considerable increase in inequality – 5 and 7 p.p. Between 2000 and 2010 this trend reversed – inequality decreased in those countries which in 1992-2000 stated its growth and vice versa. More successful Eurasian transition countries – Poland and China (120 and 410 % of GDP per capita growth in 1992-2010) had their income share by top 10%

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higher in 2000 in comparison with 1992 and in 2010 in comparison with 2000. The third group moved the same as most middle-income countries.

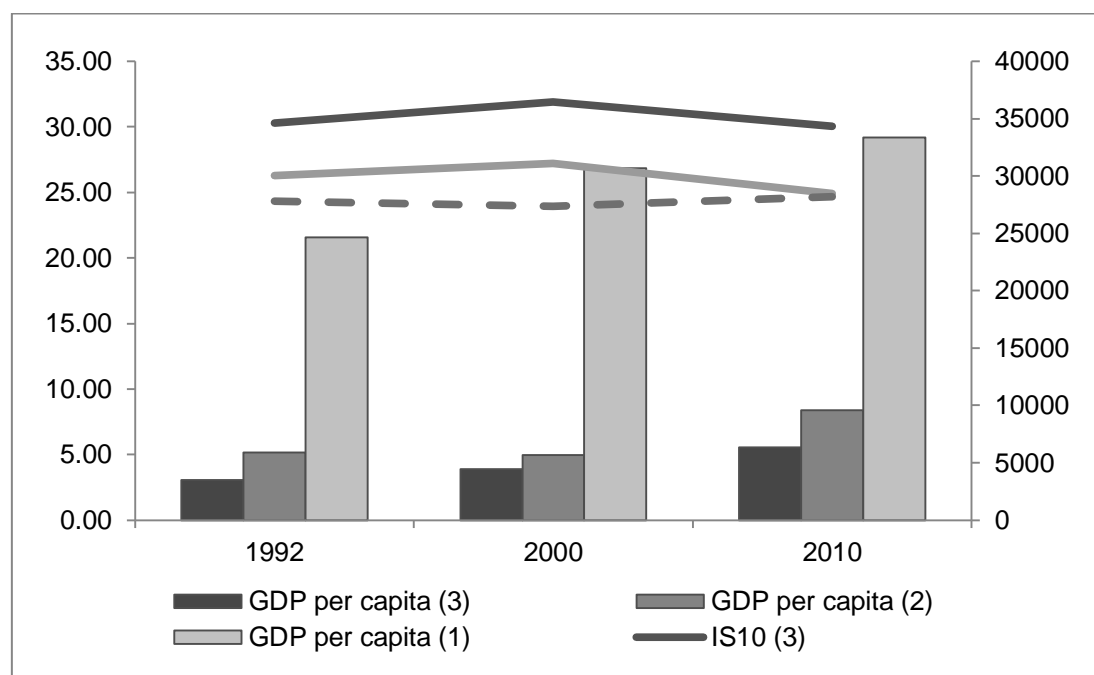


Figure 5: GDP per capita and income by 10<sup>th</sup> decile in Eurasian countries

## 6. CONCLUSIONS AND FUTURE RESEARCH

Our research has shown that inequality measured by income share of the richest still changes very slowly. It also proved that in the first part of the period under our analysis (1992-2000), there was even a rise in inequality, especially in middle-income countries. In the second part (2000-2010), there was some fall in inequality but mostly not below the starting level of 1992. We also evidenced low- and middle-income traps as low-income countries and middle-income ones have more or less the same social structure. Eurasian countries divided into three socio-economic groups stay very different in terms of inequality.

There are still many questions to be answered, e.g.: “Is there any GDP per capita growth rate where inequality starts to decrease and what is this rate?” or “Which impact is stronger - economic growth on inequality or inequality on economic growth?”; “Why for some countries inequality increases in the period of high growth?”; “What was the impact of Great Recession 2008-2009 and long recovery on inequality?”, etc. These problems are crucial for researches, governments, international organizations, etc. and will be challenged in our future works.

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## APPENDIX

**Table A1: GDP PPP per capita (international dollars 2005 constant prices) and income share by top 10% in 1992, 2000 and 2010**

	GDP per capita			Income share by top 10%		
	1992	2000	2010	1992	2000	2010
<b>Low-income countries</b>						
Uganda	579	772	1,130	34.76	34.69	36.1
Bangladesh	759	949	1,464	23.2	28.11	27.03
Mali	763	835	1,095	40.69	30.39	25.83
Zambia	1,171	1,038	1,370	39.28	42.06	47.39
China	1,338	2,667	6,819	27.44	29.72	29.98
Senegal	1,394	1,474	1,678	42.82	33.53	31.1
Pakistan	1,748	1,854	2,324	27.09	28.21	26.05
Kyrgyz Republic	1,947	1,507	2,026	40.26	27.9	28.2
Sri Lanka	2,164	3,005	4,601	27.38	33.65	30.03
Indonesia	2,338	2,679	3,873	25.01	25.08	28.18
Philippines	2,414	2,686	3,554	34.69	36.4	33.62
Madagascar	2,720	1,657	2,793	36.93	36.87	34.68
Moldova	2,720	1,657	2,793	25.64	30.63	25.97
Honduras	2,736	2,880	3,531	41.29	41.35	42.4
Bolivia	3,075	3,488	4,252	42.92	48.78	43.28
Egypt, Arab Rep.	3,328	4,236	5,760	26.73	28.34	26.58
El Salvador	3,958	5,155	5,953	41.38	39.84	37
<b>Middle-income countries</b>						
Dominican Republic	4,080	5,737	8,312	41.95	40.7	36.41
Peru	4,360	5,514	8,503	34.29	38.35	36.11
Paraguay	4,540	4,572	5,313	30.68	44.27	41.11
Thailand	4,568	5,568	7,987	38.65	33.79	30.99
Tunisia	4,807	6,054	8,495	30.69	31.57	27.59
Belarus	5,731	5,810	12,505	19.4	24.22	22.29
Kazakhstan	5,942	5,406	10,916	24.94	31.51	23.75
Colombia	6,283	6,597	8,450	40.38	47	44.43
Romania	6,347	6,838	10,715	20.19	23.55	19.46
Ecuador	6,373	6,184	7,692	42.97	46	38.32
Costa Rica	6,632	8,116	10,456	33.68	34.61	39.5
Ukraine	6,635	3,696	6,029	20.81	23.2	21.5
Panama	6,701	7,869	12,067	42.38	43.43	40.08
Brazil	7,017	7,906	10,079	39.91	47.65	42.93
South Africa	7,411	7,641	9,516	46.66	44.93	51.69
Poland	7,748	11,753	17,372	21	26.13	26.67
Malaysia	7,774	10,619	13,801	37.02	38.42	34.65
Uruguay	8,042	9,551	12,569	30.52	33.05	34.36
Chile	8,080	10,990	14,443	45.06	45.31	42.77
Turkey	8,298	9,898	12,671	32.26	33.59	30.1
Argentina	9,160	10,290	14,363	34.27	37.54	32.3
Russian Federation	10,219	8,613	14,182	38.16	30.41	31.68
Mexico	10,382	11,810	12,412	40.26	41.42	37.51

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**Table A1: Continued**

<b>High-income countries</b>						
Portugal	17,091	21,155	21,780	28	27	26.6
Greece	17,618	20,317	23,999	25	24	25.4
Ireland	18,983	33,189	36,786	26	23	24.3
Spain	20,355	25,147	26,908	25	25	24.4
Finland	20,763	27,333	31,322	20	20	21.4
United Kingdom	22,289	29,445	32,766	25	25	25.7
Australia	23,296	29,507	34,621	22	20	22
Italy	24,264	27,717	27,059	25	22	23.7
France	24,639	28,210	29,522	23	22	24.8
Belgium	25,747	30,399	32,842	23	25	21.4
Canada	25,929	32,447	35,223	31	35	35
Netherlands	26,956	33,691	36,888	23	21	21.3
Germany	27,313	30,298	33,512	22	21	23.4
Japan	27,475	28,889	31,030	21.7	23.1	25.6
Luxembourg	45,999	61,091	67,742	23	22	22.3

**Source:** World Bank, Eurostat, Statistics Canada, Statistics Bureau of Japan

**Table A2: Eurasian countries groups by GDP per capita and inequality**

<b>Old Europe + Developed Asia</b>	<b>Post-communist Europe and Asia</b>	<b>Developing Asia</b>
High GDP per capita and low inequality	Low GDP per capita and low inequality	Low GDP per capita and high inequality
Portugal, Greece, Ireland, Spain, Finland, United Kingdom, Italy, France, Belgium, Canada, Netherlands, Germany, Japan, Luxembourg	Kyrgyz Republic, Moldova, Belarus, Kazakhstan, Romania, Ukraine, Poland, Russian Federation	Malaysia, Turkey, Bangladesh, Thailand, Sri Lanka, Indonesia, Philippines, Pakistan, China

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# THE NUMBER OF REGIMES IN AGGREGATE AND INDIVIDUAL TIME SERIES IN MARKOV SWITCHING MODEL: A STATIC MODEL STUDY

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**Abstract:** This paper aims to explore the issue of whether the number of regimes in aggregate time series is similar to those in individual time series. Two methods of aggregation, which are equal and value weighted, are considered. A Monte Carlo simulation is carried out with different settings to investigate possible source of changes that could affect the number of regimes in aggregate time series. The results show that the number of regimes in aggregate time series is a function of individual time series, regardless of the aggregation method. For example, if aggregate time series has two individual series (e.g., one series has two regimes, while another time series has three regimes), the number of regimes in aggregate time series would be two. This result is consistent with Francq and Zakoian (2001, 2002).

**Keywords:** Aggregate Time Series, Individual Time Series, Markov Switching Model, Simulation, Static Model

## 1. INTRODUCTION

This paper concerns determination of the number of regimes (hereafter called  $r$ ) in aggregate time series in Markov switching model (hereafter called the MS model). Suppose that one individual time series ( $y_{1,t}$ ) has two regimes and another series ( $y_{2,t}$ ) has three regimes. When combining these two time series into one aggregate time series an interesting issue is whether aggregate time series would have a similar number of regimes to that of individual time series ( $y_{1,t}$  or  $y_{2,t}$ ). This question is not only interesting in theory but also important in practical applications. For instance, investment portfolios of most investors generally have more than one investment asset for the purpose of diversification. Assuming that there are two assets (common stocks and real estates, for example) in a portfolio and both of them have different regimes (e.g., one asset has two regimes while another asset has three regimes), would a combination of these two assets in a portfolio produce two or three regimes?

There are two general methods for aggregating time series: temporal and cross-sectional (Granger 1988). The cross-sectional aggregation is a method by which several time series are summed to form an aggregate time series at a given point in time. On the other hand, when a time series is generated on a daily or weekly basis and summed in a form of a monthly series, it can be referred to as the temporal aggregation. Quarterly or annual time series, for instance, may be constructed from monthly series. In the literature, some studies, including Girardin and Liu (2007) and Chan and Chan (2008), have examined the latter case by using the MS model. Chan *et al.* (2009), for example, investigate the effects of temporal aggregation on the MS model. They suggest that if a model is closed under temporal aggregation, parameters of the lower frequency model (or aggregate time series) can be

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directly implied by those of the higher frequency model (or individual time series). Little study, however, has examined the cross-sectional aggregation on the MS model.

This paper considers particularly two possible cross-sectional methods of combining individual series into one aggregate time series. The first method (an equal-weighted method) assumes that all individual series have the same weight. The second method (a value-weighted method) assumes that individual series have a different weight. The primary focus of this paper is on the number of regimes in aggregate time series, which is formed by the cross-sectional aggregation.

There are four papers related to this issue. They are Rose (1977), Zhang and Stine (2001), and Francq and Zakoian (2001, 2002). On the issue of cross-sectional aggregation of time series, Rose (1977) shows that the  $(p, q)$  orders of aggregate time series are a function of the orders of individual ARMA processes. In addition, this aggregate time series could be formed directly from independent ARMA models. More specifically, the weighted sum of  $n$  independent ARMA processes of orders  $(p_i, q_i)$ ,  $i = 1, 2, \dots, n$  is an ARMA process of order  $(p, q)$  where  $k$  is the total number of root repetitions among the polynomials and

$$p \leq \sum_{i=1}^n p_i - k, q \leq \max_i (p + q_i).$$

For example, if there are three independent time series without root repetitions and  $p_i$  for each of them is one, then when combining these three models into one aggregate time series, the order  $p$  of the aggregate time series would be less than or equal to three. Zhang and Stine (2001) first show that the auto-covariance function of a second-order stationary MS model without intercept term can be represented as that of VARMA model and the orders of VARMA model are directly linked with the number of regimes. Francq and Zakoian (2001, 2002) extend this result to any second-order stationary MS model (with or without intercept term). The results can be summarised as follows: (i) in the case of MS static model where both  $p$  and  $q$  are zero, there exists an ARMA( $r-1, r-1$ ) representation; (ii) in the case of MS model that allows autoregressive parameters to be varying, both  $p$  and  $q$  orders will be a function of the  $p, r$ , and the dimension of the processes (hereafter called  $h$ ), which may be calculated as  $r + r(hp)^2 - 1$  and  $r + r(hp)^2 - 2$ , respectively.

The above ideas when combined together imply that any second-order stationary MS models can be represented as the VARMA model, where both  $p$  and  $q$  can be calculated from  $r$ . In particular, the  $(p, q)$  orders of the VARMA model are a function of that of individual ARMA models and the number of regimes in the MS models is also a function of the orders of individual ARMA models. For example, if the true model of individual time series is a two-regime MS autoregressive model of order one ( $r_i = 2; p_i = 1$ ), Francq and Zakoian (2001, 2002) suggest that individual time series admits an ARMA(1, 1) representation. According to Rose (1977), the aggregate time series also has an ARMA representation with  $p \leq 3$  and  $q \leq 4$  which translates into a MS autoregressive model with  $r \leq 0.04$  and  $p \leq 3$ .

The motivation for this paper is stated as follows: First, the above analytical results only provide an upper bound with which the number of regimes in aggregate time series can be identified. It is interesting to see whether this bound holds true or not when confronted with actual data. Second, they may not apply to a MS static model where there are exogenous variables. Third, they may not apply to cases where some individual time series has number of regimes different from the others. A Monte Carlo simulation with different settings is proposed to investigate possible sources of changes that could affect the number of regimes in aggregate time series. These settings include a difference in number of individual series in aggregate time series, sample size, parameters, and noise level. The results suggest that the number of regimes in aggregate time series is a function of that of individual time series, regardless of whether the aggregation method is equal or value weighted. For example, if

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aggregate time series has two individual series (e.g., one series has two regimes and one exogenous variable, while another time series has three regimes and one exogenous variable), the numbers of regimes and variables in aggregate time series would be two and one, respectively. This result is consistent with Francq and Zakoian (2001, 2002).

The reminder of the paper is organised as follows. Section 2 presents the class of the MS models under consideration. Sections 3 and 4 present the set-up of Monte Carlo studies and their simulation results. Section 5 concludes the paper.

## 2. MODELS AND ASSUMPTIONS

This paper considers the MS static model of the following form:

$$y_t = v^{(s_t)} + A_t^{(s_t)} x_t + \sigma^{(s_t)} e_t \quad (1)$$

where  $s_t$  are unobservable random variables that take values in the finite set  $\{1, 2, \dots, r\}$  and are independent of  $e_t$  and

$e_t$  is independent and identically distributed random variables such that  $E(e_t) = 0$ .

The random variables,  $s_t$ , (hereafter referred to as regime variables) are assumed to be a temporally homogeneous first-order Markov chain on  $\{1, 2, \dots, r\}$  with transition matrix  $P = p_{ij}$ ,  $i$  and  $j \in \{1, 2, \dots, r\}$ , where  $p_{ij} = \text{Prob}(s_{t+1} = j | s_t = i)$ . It is also assumed that  $s_t$  are periodic and irreducible. Notice that  $s_t$  may or may not be stationary. If the stationarity assumption is imposed, the above conditions guarantee a unique row-stochastic vector  $\pi = (\pi_1, \pi_2, \dots, \pi_r)'$  such that  $\pi P = \pi$  and  $\pi_i = \text{Prob}(s_t = i) > 0$  for all  $i \in \{1, 2, \dots, r\}$  and all  $t$ . Under these assumptions, the model could be referred as an  $r$ -regime MS static model (or MS( $r$ ) static model).

It is assumed that  $r$  of the MS static model are unknown, so the interesting issue is to estimate  $r$  on the basis of a finite segment  $y_n = (y_1, y_2, \dots, y_T)$  of length  $T$  from Equation (1). This paper identifies  $r$  by using Schwarz (1978) information criterion (hereafter called BIC) since Awirothananon and Cheung (2009) show that BIC outperforms other information criteria (including Akaike (1974) information criterion, HQC (Hannan and Quinn 1979), and MSC (Smith *et al.* 2006)) in joint determination of the numbers of states and variables. BIC can be calculated as  $\text{BIC} = -2L + k \log(T)$ , where  $L$ ,  $k$ , and  $T$  are the maximised log likelihood value, the number of estimated parameters, and the total observations, respectively.

The MS model could be estimated by using a maximum likelihood (hereafter called ML) procedure. The ML algorithm of this model is based on the expectation maximisation algorithm discussed in Krolzig (1997). This algorithm is originally described by Dempster *et al.* (1977) as a general approach to iteratively compute the ML estimation technique. This technique is designed for general models where observed variables are dependent on some unobserved variables,  $s_t$ .

## 3. SIMULATION DESIGN

This paper considers two possible cases of forming aggregate time series. The first case assumes that all individual time series have the same regime (in this case is two regimes). Another case is that all individual time series have a different regime. All variables are independent and identically distributed random variables with zero mean and unit variance. Possible factors that could affect regime in aggregate time series are also included in the simulation settings as follows:

- (i) MS static model: the true model consists of two regimes (or  $r = 2$ ) and one exogenous variable with an intercept term in each regime. The true regression coefficients are  $v^{(st)} =$

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- (0, 1) and  $A^{(st)} = (0.3, 0.9)$ . The r-regime variable,  $s_t$ , is a Markov chain with transition probabilities  $p_{11} = 0.6$  and  $p_{22} = 0.4$  and the initial probabilities are set to 0.1 and 0.9. The total number of observations,  $T$ , is initially set to 200 and  $e_t \sim N(0, 1)$  and  $\sigma^{(st)} = (0.5, 0.5)$ .
- (ii) MS static model with small/large coefficient: this paper considers variation from the setting (i). First, this paper changes the coefficient for both regimes to the same value:  $\sqrt{^{(st)}} = (0, 1)$  and  $A^{(st)} = (0.3, 0.3)$ . Second, setting the intercept term for both regimes to the same value:  $\sqrt{^{(st)}} = (0, 0)$  and  $A^{(st)} = (0.3, 0.9)$ .
  - (iii) MS static model with high/low transition probability: this paper also considers variations from the settings (i) and (ii) by changing the transition probability  $p_{11}$  from 0.6 to 0.9 and  $p_{22}$  from 0.4 to 0.1 and the initial probabilities from (0.1, 0.9) to (0.4, 0.6). To examine the impact of persistence in  $\{s_t\}$ , the transition probabilities  $p_{11}$  and  $p_{22}$  are also set to 0.9 so that their sum is greater than one.
  - (iv) MS static model with small/large sample and high/low noise level: the following variations from the settings (i), (ii), and (iii) are considered. First, to examine the impact of sample size on performance, this paper conducts the above simulations using  $T = 100, 400$ , and  $500$ , respectively. Second,  $\sigma^{(st)} = (1.0, 1.0)$  and  $(0.5, 1.0)$  for all  $T$  to understand the effect of a change in noise level.

The second case where a different regime is set to each individual time series is also investigated. In particular, this paper considers only two time series; one series has two regimes while another time series has three regimes. The simulation designs for this case are discussed below:

- (v) For two-regime time series, the initial probabilities are set to 0.1 and 0.9 with the transition probabilities as  $p_{11} = 0.6$ ;  $p_{22} = 0.4$ . The true regression coefficients are  $\sqrt{^{(st)}} = (0, 1)$  and  $A^{(st)} = (0.3, 0.9)$ . For the regime-specific case, the  $\sigma^{(st)}$  is set to 0.5 if  $st =$  regime 1 and 1 if  $s_t =$  regime 2. For the three-regime time series, initial probabilities are set to 0.1, 0.3, and 0.6 with the transition probabilities as  $p_{11} = 0.6$ ;  $p_{22} = 0.3$ ;  $p_{33} = 0.1$ . The true coefficients are  $\sqrt{^{(st)}} = (0, 0.4, 0.6)$  and  $A^{(st)} = (0.3, 0.4, 0.5)$ . For the regime-specific case,  $\sigma^{(st)}$  is set to 1/3, 1/3, and 1/3 for  $s_t =$  regime 1, regime 2, and regime 3, respectively.
- (vi) The models with small/large coefficient: the coefficient in the setting (v) will be set as follows: First, setting the coefficient for all regimes to the same value:  $\sqrt{^{(st)}} = (0, 1)$  and  $A^{(st)} = (0.3, 0.3)$  for two-regime time series, while  $\sqrt{^{(st)}} = (0, 0.4, 0.6)$  and  $A^{(st)} = (0.3, 0.3, 0.3)$  are assigned to three-regime time series. Second, setting the intercept coefficient for all regimes to the same value:  $\sqrt{^{(st)}} = (0, 0)$  and  $A^{(st)} = (0.3, 0.9)$  are set to the two-regime time series, while the three-regime series has  $\sqrt{^{(st)}} = (0, 0, 0)$  and  $A^{(st)} = (0.3, 0.4, 0.5)$ .
- (vii) The models with small/large sample and high/low noise level: the following variation from the settings (v) and (vi) is considered to change. First, to examine the impact of sample size on performance, the above simulations is conducted using  $T = 100, 400$ , and  $500$ , respectively. Second, setting  $\sigma^{(st)}$  to (1, 1) and (0.5, 0.1) for the two-regime time series, while the three-regime time series has  $\sigma^{(st)} = (1, 1, 1)$  and (1/3, 0.5, 1.0).
- (viii) The models with high/low transition probabilities: the transition probabilities in the settings (v) to (vii) will be changed from (0.6, 0.4) and (0.6, 0.3, 0.1) to (0.9, 0.1) and (0.9, 0.08, 0.02), respectively. This paper also changes the initial probabilities from (0.1, 0.9) and (0.1, 0.3, 0.6) to (0.4, 0.6) and (0.4, 0.1, 0.5) for the two-regime and three-regime time series, respectively.

The number of individual time series,  $n$ , in this paper will be set to 3, 10, 30, 100, and 500, respectively. The simulations proceed by first generating an artificial time series,  $y_t$ , and exogenous variables,  $x_t$ , of length  $500 + T$  according to the settings (i) and (viii) and setting initial values to zero. The first 500 pseudo-data points then are discarded in order to eliminate start-up effects, while the remaining  $T$  points are used to determine  $r$  minimising BIC over  $r$  regimes ( $r = 2, 3$ ). Since computations are very intensive, 1,000 Monte Carlo

replications are carried out for each setting to assess how often BIC selects the model with  $r$  regimes.

### 4. SIMULATION RESULTS

All results in this section are generated by using Ox Metrics version 3.40 (see Doornik 2002) and the MSVAR package version 1.32a (Krolzig 1998). The data generating process is a two-regime MS static model with one exogenous variable for different sample size, parameters, and noise level. To ease interpretation, this paper hereinafter refers to any MS static model that observes the relationship as the expected model. The results will show how many times that aggregate time series has  $r$  regimes ( $r = 2, 3$ ), if the true model of individual time series is a two-regime MS static model of one exogenous variable ( $r_i = 2$ ) for different settings. These settings include a difference in number of individual series in aggregate time series, sample size, parameters, and noise level. Notice that only value-weighted method is firstly considered to form aggregate time series. In particular, the results show the benchmark case where the initial probabilities of state 1 and state 2 are set to 0.4 and 0.6, respectively, and the transition probability of moving from state 1 (2) to state 2 (1) is set to 0.4 (0.6). This paper first allows for change in regression coefficient only. The case allowing for change in intercept term is also employed. This paper further allows for both intercept term and regression coefficient to be regime-specific. In addition, this paper considers the case where there is a change in transition probabilities from (0.6, 0.4) to (0.9, 0.1), while another case deals with a change in the initial probabilities. This paper also considers the case where  $\{s_i\}$  is allowed to be persistent.

Before proceeding into the details, two main noticeable results can be seen. First, an increase in noise level could reduce the frequency of two regimes and one exogenous variable selection. Second, increasing sample size does help to identify the true model. Allowing for change in regression coefficient only, the results show that aggregate time series has more than 90% chance of having two regimes and one exogenous variable. Remarkably, the frequency of three-regime selection is zero when the sample size becomes larger. With 100 observations and the noise level of 0.5, for instance, the number of times that aggregate time series of three individual series has two regimes and one exogenous variable is 928 out of 1,000. This frequency reduces to 911, when the noise level is high.

The results of changing in intercept term only exhibit a similar result; an increasing in sample size leads to a better frequency of the true model identification. As an example, if the sample size is 100 and the noise level is high, the results indicate that the frequency of two regimes and one exogenous variable selection for 30 individual series in aggregate time series is 907. The frequency increases significantly to 970 when the sample size becomes 500 observations. Regardless of the number of individual time series being considered, increasing sample size or reducing the noise level could improve the chance of the true model selection, while allowing for change in variance could not.

The results, where the model allows for regime change in both intercept term and regression coefficient, basically reinforce observations from the previous results. Compared to the result of allowing for change in regression coefficient only, however, the results show that the frequency of two regimes and one exogenous variable selection is generally higher. In the case of 200 observations with low noise level, for instance, the frequency of the true model identification for 30 individual series in aggregate time series is 970 out of 1,000. This number is slightly higher than those prior results because the corresponding number is 965.

Change in transition probabilities from (0.6, 0.4) to (0.9, 0.1) generally leads to a slight increase in frequency of two regimes and one exogenous variable selection. The results reveal that change in initial probabilities from (0.1, 0.9) to (0.4, 0.6) leads to a better identification of the model with two regimes and one exogenous variable. With 200



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observations and high noise level, for instance, the frequency of true model selection for 30 individual series in aggregate time series is 952. This number is higher than those allowing for change in regression coefficient only since the corresponding number is 943 out of 1000. In addition, persistence in  $\{s_t\}$  generally increases the frequency of selecting the model with two regimes and one exogenous variable.

This paper also considers another case, where all individual series having the same weight when forming aggregate time series. Similar assumptions of value-weighted model are employed. The results suggest that the results of equal-weighted method are generally higher than those of value-weighted method, regardless of changes in regression coefficient or an intercept term or in both. With 400 observations and low noise level, for example, the frequency of the model identified with two regimes and one exogenous variable for 500 individual series in aggregate time series is 989. This number is marginally higher than that allows for changing in intercept term only, which is 986.

Other three possible factors that could influence the number of regimes in aggregate time series are changes in transition and initial probabilities and allowing for persistence in  $\{s_t\}$ . The results suggest that changes in transition and initial probabilities lead to an increase in frequency of the true model identification. In addition, allowing for persistence in  $\{s_t\}$  does increase the frequency. As an example, if the sample size is 400 and low noise level, the results indicate that the frequency of two regimes and one exogenous variable selection for 10 individual series in aggregate time series is 992 out of 1000. This number is slightly higher than that allows for changing in regression coefficient only, which is 983.

This paper further investigates an additional factor where individual time series have a different  $r$ . All previous settings are used with this case. Only two time series are considered for this case; one series has two regimes, while another series has three regimes. The results suggest that aggregate time series has more than 90% chance of having two regimes and one exogenous variable. In addition, aggregate time series tends to have two regimes rather than three regimes. With 100 observations and the noise level of 0.5, for instance, the chance that aggregate time series with individual series equally weighted, has two regimes and one exogenous variable is 95.4%. This frequency slightly increases to 99.5% when the sample size is 500 observations, while the chance of having three regimes for aggregate time series is zero. This paper also explores changes in transition and initial probabilities that could affect  $r$  in aggregate time series. The same settings as the above are employed to investigate the effect from these two changes. The results suggest that these changes could not alter the main conclusion.

## 5. CONCLUSION

This paper investigates the issue of whether the number of regimes in aggregate time series is similar to those in individual time series. A Monte Carlo simulation is carried out with different settings to investigate possible sources of changes that could affect the number of regimes in aggregate time series. For aggregation purpose, this paper considers both equal and value weighted methods. The results suggest that the number of regimes in aggregate time series are a function of individual series, regardless of whether the aggregation method is equal or value weighted. For example, if aggregate time series has two individual series (e.g., one series has two regimes and one exogenous variable, while another time series has three regimes and one exogenous), the numbers of regimes and variables in aggregate time series would be two and one, respectively. This result is consistent with Francq and Zakoian (2001, 2002).

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# **COUNTRY-SPECIFIC CONVERGENCE BEHAVIOR IN AN ENLARGED EUROPE**

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**Abstract:** By reason of economic pressures of globalization and increased competition, countries need to take part in an economic integration. European Union is the main interest of this paper on account of the long-established integration from 1950's. This paper examines the process of convergence in relative GDP per capita across European Union countries and candidate countries, and investigates the effects of trade openness, changes in economic activities and government consumption in the growth process. We present second generation panel cointegration tests of the theory for the European Union countries and candidate countries for the period 1990-2011. In the first step, we tested heterogeneity and cross-section dependence among countries and found that all series have cross-section dependence. For that reason, we used second generation panel unit root and panel cointegration tests. These tests have the consideration of cross-section dependence, so it is important to consider this to improve the reliability of the estimation results. This paper also gives country-specific conditional and unconditional convergence results at the long-run model via using Common Correlated Effect Model. This contribution provides crucial information about the European Union countries and candidate countries.

**Keywords:** Economic Integration, Enlargement Process, Convergence, Common Correlated Effect Model

## **1. INTRODUCTION**

From the 1950s up until the mid-1980s, the literature concerned with long run growth was dominated by the Neoclassical Growth Model- a la Solow (Solow, 1956). According to this theory, the economy - due to diminishing returns on investment in physical capital, converges towards a steady state conditioned upon the behavioral and technological parameters in the model. After the mid-1980s, the Endogenous Growth Theory [EGT] seeks to explain the causes of technical progress as a driver of economic growth. However, early versions of EGT did not predict the conditional convergence that characterizes the Neoclassical Growth Model. For example, Barro and Sala-i-Martin (1997) extend the EGT model and added the diffusion of technology and human capital to account for economic growth. When imitation tends to be cheaper than innovation, the diffusion models predict a form of conditional convergence that resembles the predictions of the Neoclassical Growth Model. This framework combines the long-run growth features of EGT with the convergence behavior of the Neoclassical Growth Model (Barro, 1997).

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The effects of technological diffusion on economic growth have been analyzed by Grossman and Helpman (1991) and Rivera-Batiz and Romer (1991). Also, Bernard and Jones (1996) suggest that differences in technologies across countries can have implications for convergence.

In this paper, we analyze the convergence of per capita GDP across existing European Union (EU) countries and candidate countries. We specifically test the extent to which convergence is derived from human capital investment, nature of economic activity, trade openness which partially capture the process of technology diffusion. These conditioning variables have been selected because they reflect openness to technical progress.

We apply panel data tests of convergence with annual data available from 1990 to 2011. We have expanded the EU data set to include candidate countries' data and the results have some important policy implications both for EU and candidate countries. The rest of the paper is organized as follows: Section 2 comprises the literature review. Section 3 discusses the theoretical model of convergence. Section 4 explains the empirical specifications, data set and results for unconditional and conditional convergence. Section 5 concludes.

### 2. LITERATURE REVIEW

In recent years, several studies have considered the convergence between EU countries and candidate countries. For example, Saracoglu and Dogan (2005) analyze the convergence hypothesis for EU countries and candidate countries. Using panel unit root tests, they find that candidate countries converged to the EU during 1985-2004. Altin *et al.* (2010) analyze the convergence hypothesis for the period 1970- 2004 and find that enlargement positively affects convergence. Dogan and Saracoglu (2007) used panel unit root tests to investigate income convergence for the EU and candidate countries. Using quarterly data for the period 1990- 2004, they found that there is no income convergence among established EU countries but that evidence of convergence exist for an expanded group that includes candidate countries. Some candidate countries appear to be converging on the EU average. Yigit and Kutun (2007) construct an EGT to investigate the consequences of economic integration for convergence and productivity growth. Their empirical results suggest that accession to the EU is a potential, though not guaranteed, opportunity for faster growth and convergence. Willem te Velde (2011) examined how regional integration leads to convergence and growth among 100 developing countries for the period 1970-2004. He couldn't find robust growth effect of regional integration.

Many researchers believe that increasing economic integration among the countries will increase the long term growth rates. According to Romer (1993), the growth rate increases if economic integration in EGT provides two economies with the opportunity of benefiting from increasing scale economies. According to this model, integration ensures trade of goods, flow of ideas or both. Baldwin (1989) argues that trade deficiency, removal of non-tariff barriers and the enlargement of market increases the net profits. If more countries become a member of the union, higher growth rates are achieved. Dollar (1992) examines sources of growth in 95 developing countries and finds a strong positive correlation between a measure of outward orientation and per capita GDP growth. Frankel and Romer (1996) using cross-country regressions conclude that trade has a quantitatively large, significant and robust positive effect on income. Baldwin and Seghezza (1996) put emphasis on the effect of the European integration on the growth. They developed two models, the first one being the per capita GDP growth model. This model includes the population growth rate, human capital investments, human capital at the beginning level and the ratio of investments to GDP. In the second model, investment equality is estimated by adding the investment rate to the similar variables found in the growth model and domestic and foreign trade barriers. It was found out that domestic and foreign trade barriers tend to reduce the investments and consequently have a negative impact on the growth. They said trade barriers are sharply reduced in the

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European integration. Wacziarg (2001) investigates the links between trade policy and economic growth using data from a panel of 57 countries from 1979 to 1989. The results suggest that trade openness has a strong positive impact on economic growth.

### 3. A THEORETICAL MODEL OF CONVERGENCE

A theoretical model of convergence in per capita output can be developed from the neo-classical model of growth, as developed by Solow (1956). Following Barro and Sala-i-Martin (1995), the production function can be rewritten as:

$$\hat{y} = f(\hat{k}) \Rightarrow f'(\hat{k}) > 0, f''(\hat{k}) < 0 \quad (1)$$

where  $Y$  is the total output while  $A$  is an efficiency parameter. And  $\hat{y} = Y/L$ ;  $\hat{k} = K/L$ , where  $K$  is capital and  $L$  is units of effective labor.

There are two exogenous sources of growth in effective labor units: the rate of technical progress,  $x$ , and the rate of growth of working population,  $n$ . Hence, we have

$$L = Ne^{xt} = N_0 e^{(n+x)t} \quad (2)$$

where  $N_0$  is initial population.

With a closed economy, the rate of investment is equal to the rate of saving which is  $Y-C$ , where  $Y$  is income and  $C$  is consumption. Thus,

$$\dot{K} + \delta K = Y - C \quad (3)$$

where  $\dot{K}$  is change in capital stock while  $\delta$  is depreciation. The capital accumulation growth path then is

$$\dot{\hat{k}} = f(\hat{k}) - \hat{c} - (\delta + n + x)\hat{k} \quad (4)$$

where  $\hat{c} = C/L$ . The representative household maximizes utility by

$$U = u(c), u'(c) > 0, u''(c) < 0 \quad (5)$$

where  $c = C/N$ .

Instantaneous social utility is defined as the product of the population size and the utility-from-consumption of the representative consumer. The social objective function to be maximized is the discounted future time path of social utility, discounting representing time preference.

$$u = N_0 \int_0^{\infty} u(c) e^{-(\rho+n)t} dt \quad (6)$$

The optimal growth path, therefore, maximizes the above objective, subject to the capital accumulation constraints. The current value Hamiltonian is

$$H = u(c) + m[f(\hat{k}) - \hat{c} - (\delta + n + x)\hat{k}] \quad (7)$$

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The maximum principle requires

$$\frac{\partial H}{\partial c} = u'(c) - m = 0 \quad (8)$$

$$\frac{\partial H}{\partial m} = f(\hat{k}) - \hat{c} - (\delta + n + x)\hat{k} = \dot{\hat{k}} \quad (9)$$

$$\frac{\partial H}{\partial k} = m[f'(\hat{k}) - (\delta + n + x)] - (\rho - n)m = -\dot{m} \quad (10)$$

Differentiate equation (8) with respect to time

$$u''(c)\dot{c} = \dot{m} \quad (11)$$

Use equations (6) and (9) to eliminate  $m$  and  $\dot{m}$  in equation (10).

$$\dot{c} = \frac{u'(x)}{u''(x)} [f'(\hat{k}) - (\delta + x + \rho)] \quad (12)$$

$$\dot{\hat{k}} = f(\hat{k}) - \hat{c} - (\delta + n + x)\hat{k} \quad (13)$$

The above equation can be linearised using the Taylor expansion theorem. But the characteristic roots cannot be compared unless special functional forms are assumed for  $u(c)$  and  $f(k)$ .

Following Barro and Sala-i-Martin (1995), we assume that the utility function takes the form

$$u(c) = \frac{c^{1-\theta} - 1}{1-\theta} \quad (14)$$

Since  $u'(c) = c^{-\theta}$  and  $u''(c) = -\theta c^{-\theta-1}$ , equations (14) and (13) become

$$\dot{c} = \frac{c}{\theta} [f'(k) - (\delta + x + r)] \quad (15)$$

Equations (13) and (15) provide steady state growth paths for  $k$  and  $c$ . In the steady state  $y$ ,  $k$ , and  $c$  grow at the rate of  $x$ . To show the stability of the model, we can linearise in the zone of steady state equilibrium  $(\bar{c}, \bar{k})$ . This yields

$$\begin{bmatrix} \dot{k} \\ \dot{c} \end{bmatrix} = \begin{bmatrix} \psi & -1 \\ \frac{c}{\theta} f'(k) & 0 \end{bmatrix} \begin{bmatrix} k - \bar{k} \\ c - \bar{c} \end{bmatrix} \quad (16)$$

where  $\psi = \rho - n - (1-\theta)x$  which is regarded as positive and in the steady state,  $f'(k) = \delta + \rho + (1+\theta)x$

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Thus the last term in the 2x2 matrix is zero. The system shows saddle path stability because the trace and determinants of A are positive and negative respectively, i.e.

$$Tr(A) = \Psi > 0$$

$$Det(A) = -(c/\theta)f'(k) < 0 \quad (17)$$

The stable root,  $\beta$ , is given by

$$\beta = -Tr(A) + \left\{ Tr(A)^2 - 4Det(A) \right\}^{1/2}$$

given a Cobb-Douglas production function (CDPF), i.e.

$$\hat{y} = f(\hat{k}) = A\hat{k}^\alpha$$

This yields

$$\beta = \frac{1}{2} \left\{ \psi^2 + 4 \left( \frac{1-\alpha}{\theta} \right) (\rho + \delta + \theta x) \left[ \frac{\rho + \delta + \theta x}{\alpha} - (n + \delta + x) \right] \right\}^{1/2} - \frac{\psi}{2} \quad (18)$$

Note with CDPF, the dynamic time paths of y and k are identical. Hence, in discrete time, the solution for  $\log[\hat{y}(t)]$  is

$$\log[y(t)] = \log[y(0)]e^{-\beta t} + \log(\bar{y})(1 - e^{-\beta t}) \quad (19)$$

The greater the value of  $\beta$ , the greater the responsiveness of the average growth rate to the gap between  $\log(\bar{y})$ , long run equilibrium level, and the initial level of income, i.e.  $\log[y(0)]$ . The model implies conditional convergence in that for given values of x and  $\bar{y}$ . The growth rate is higher the lower is  $\log[y(0)]$ . This is the standard  $\beta$  convergence process (see Barro and Sala-i-Martin, 1995).

For empirical estimation, we follow

$$\log\left(\frac{y_{it_0+T}}{y_{it_0}}\right) = \theta - (1 - e^{-\beta T})\log(y_{it_0}) + u_{i,t_0,t_0+T} \quad (20)$$

where  $\theta = x + [(1 - e^{-\beta T})][\log(\bar{y}) + \alpha T]$ ,  $u_{i,t_0,t_0+T}$  is the error term and i indices of the countries. Eq (21) is  $Y_{i,t_0+T} - Y_{i,t_0} = a + b_0 Y_{i,t_0} + v_{it}$ , in which the coefficient on  $\log(y_{it_0})$  - i.e. on  $Y_{i,t_0}$ , is constant.

## 4. EMPIRICAL SPECIFICATIONS AND RESULTS

To test our convergence hypotheses, we use the specifications derived from the previous section. Equation (21) implies the test for unconditional convergence while equation (22) specifies conditional convergence.

The empirical models for the estimation at a given time are thus

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$$Y_{i,t} - Y_{i,t0} = a + b_0 Y_{i,t0} + v_{it} \quad (21)$$

and

$$Y_{i,t} - Y_{i,t0} = a + b_0 Y_{i,t0} + b_1 TRADE_{it} + b_2 AGRI_{it} + b_3 GC_{it} + v_{it} \quad (22)$$

where T= number of years in the period from 1990 to 2011 and  $i = 1, 2, \dots$ , and 24 European Union countries and candidate countries Turkey and Macedonia. Our panel data set is a balanced one, so the other countries couldn't be existed in the analysis due to the lacking data.  $a$  and  $b_0, b_1, b_2$  and  $b_3$  are the parameters to be estimated. Here,  $Y_{i,t}$  is the natural logarithm of real GDP per capita in country  $i$  at time  $t$ .  $Y_{i,t0}$  is the natural logarithm of real initial GDP per capita.

The model considers four other explanatory variables, which are expected to control for the effects of technology diffusion: an open trade policy, change in economic activities, and government consumption expenditures. It is now generally acknowledged that a relatively liberal trade regime along with structural economic changes is the main vehicles of technology diffusion. These variables are demeaned before estimation for the purpose of removing some of the correlations that may exist across the error terms (see Lee *et al.* 1997).

Thus, equation (22) tries to show how income per capita depends on trade, structural change and government consumption expenditures and it shows the effectiveness of government policies. We assume that trade could be the engine of economic growth; although some argue that causality could be bi-directional (Ghatak and Wheatley-Price, 1996). Trade is also important, because a higher degree of integration with the world market means higher level of technology. Some researchers believe that limitations in trade slow down the speed of growth. TRADE is the export of goods and services (% of GDP). TRADE is included under the assumption that there is a correlation between higher degrees of integration with the world market and higher levels of technology. Countries with more exports are likely to have used their resources more efficiently.

We use AGRI as the percentage of GDP that is produced by the agricultural sector to capture the impact of structural change. AGRI is included to allow for the differing composition of economic activities within European Union countries and candidate countries. Economic development literature has long assumed that different components of economic activity have different levels of technology (Ghatak and Li, 2006). Thus, countries with a higher percentage of GDP in agriculture are expected to have lower level of technology.

Our last explanatory variable is general government final consumption expenditures (% of GDP). GC is included on the basis that government consumption expenditures effect economic growth negatively, and it is important for seeing the effectiveness of government policy decisions. We collected the data from World Bank Development Indicators, and we used Gauss codes for econometric tests.

At the empirical application, first step is heterogeneity test. Pesaran and Yamagata (2008) developed Delta test to examine the heterogeneity between cross section units. Under the assumption of fixed effect and heterogeneous slopes Pesaran and Yamagata (2008):

$$y_{it} = \alpha_i \tau_T + X_i \beta_i + \varepsilon_{1,i}, \quad \forall i = 1, 2, \dots, N \quad (23)$$



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where  $\tau_T$  indicates  $T \times 1$  vector of ones,  $\beta_i$  is  $k \times 1$  vector of unknown slope coefficient,  $y_i = (y_{i1}, \dots, y_{iT})'$ ,  $x_i = (x_{i1}, \dots, x_{iT})'$ , and  $\varepsilon_{1,i} = (\varepsilon_{1,i1}, \dots, \varepsilon_{1,iT})'$ . According to the Delta test, null and alternative hypotheses are as follows:

$$\begin{aligned} H_0 : \beta_i &= \beta \\ H_1 : \beta_i &\neq \beta_j \end{aligned} \quad (24)$$

If null hypothesis is failed to reject, then series are homogeneous. Otherwise, at least one series is different from the others and hence the series are heterogeneous. Our Delta test results are shown in table 1 below.

**Table 1: Delta test results for unconditional convergence model**

Test	Test Statistics	Probability
$\tilde{\Delta}$	0.370	0.356
$\tilde{\Delta}_{adj}$	0.397	0.346

$H_0$  is not rejected, so slope coefficients in the cointegration equation are homogeneous. Then we estimated Delta test for conditional convergence model. The results are shown below in table 2.

**Table 2: Delta test results for conditional convergence model**

Test	Test Statistics	Probability
$\tilde{\Delta}$	1.612**	0.053
$\tilde{\Delta}_{adj}$	1.823**	0.034

**Note:** \*\*\* indicates that the coefficient is significant at 5%.

As  $H_0$  is rejected, slope coefficients in the cointegration equation are heterogeneous. It is important to determine the Cross-section dependence (CD) before implementing unit root tests. To this end, we used *CD* test of Pesaran (2004). Standard panel data model Pesaran (2004):

$$y_{it} = \alpha_i + \beta_i' x_{it} + \varepsilon_{2,it}, \quad \text{for } i=1,2,\dots,N \text{ and } t=1,2,\dots,T \quad (25)$$

where  $i$  indicates the cross section dimension,  $t$  the time series dimension,  $x_{it}$  is  $k \times 1$  vector of observed time-varying regressors,  $\alpha_i$  are individual intercepts,  $\beta_i$  are slope coefficients.

To test cross section dependence, test statistics is computed as follows Pesaran (2004):

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left( \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij} \right) \quad (26)$$

*CD* statistic of Pesaran has mean zero for fixed values of  $T$  and  $N$ , where  $N$  indicates cross section dimension,  $T$  is time dimension of panel,  $\hat{\rho}_{ij}$  represents the sample estimate of the cross sectional correlations among residuals. The hypothesis for the computed test

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statistics are:

$$\begin{aligned} H_0 : \rho_{ij} = \rho_{ji} = \text{cor}(\varepsilon_{2,it}, \varepsilon_{2,jt}) &= 0 \\ H_1 : \rho_{ij} = \rho_{ji} &\neq 0 \end{aligned} \quad (27)$$

The CD test results are shown in table 3 below.

**Table 3: Cross section dependence test**

Variable	Test Statistics
$Y_{i,t0}$	15.682***
AGRI	7.536***
TRADE	7.871***
GC	5.344***

**Note:** \*\*\* indicates that the coefficient is significant at 1%.

Test statistics show that there is cross section dependence for all series. Hence, one needs to take into consideration the cross section dependence while undertaking unit root tests. Otherwise, the results would be biased. The appropriate unit root test in that case is Cross-Sectionally Augmented *Dickey-Fuller* (CADF) test of Pesaran (2007). In the CADF test, standard DF (or ADF) regressions with the cross-section averages of lagged levels and first-differences of the individual series are augmented, and then standard panel unit root tests are based on the simple averages of the individual CADF statistics Pesaran (2007). Pesaran's asymptotic results are obtained both for the individual CADF statistics and their simple averages, which are called Cross-Sectionally Augmented Im, Pesaran, Shin (CIPS) Test. The null and alternative hypotheses of the CADF test are shown below:

$$\begin{aligned} H_0 : \beta_j &= 0 \\ H_1 : \beta_j &< 0 \quad j = 1, 2, \dots, N_1; \quad \beta_j = 0, \quad j = N_1 + 1, N_1 + 2, \dots, N \end{aligned} \quad (28)$$

where  $N$  indicates number of cross sections. CADF regression is shown below Pesaran (2007):

$$\Delta y_{it} = a_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + e_{1,it} \quad (29)$$

where  $\Delta y_{it} = y_{it} - y_{i,t-1}$ ;  $y_{i,t-1}$  is the first lag of  $y_{it}$ ;  $\bar{\Delta y}_t$  is cross-section mean of  $\Delta y_t$  and  $e_{1,it}$  is residuals. CIPS test is based on Pesaran (2007):

$$CIPS(N, T) = N^{-1} \sum_{i=1}^N t_i(N, T) \quad (30)$$

where  $t_i(N, T)$  is the CADF statistics for  $i^{\text{th}}$  cross-section unit given by the t-ratio of the coefficient of  $y_{i,t-1}$  in the CADF regression defined by (29). CIPS test gives only one value. CIPS test results are shown in table 4 below.

**Table 4: CIPS test results**

Variable	Test Statistics
$Y_{i,t0}$	-2.3351***
AGRI	-2.6738***
TRADE	-2.8907***
GC	-1.5974***

**Note:** \*\*\* indicates 1% level of significance, respectively.

According to Table 4, null hypothesis of non-stationary is not rejected at 1% or 5% level of significance for all series. That is, there is unit root problem.

Given the cross section dependence of our series, we run/employ second generation panel cointegration tests. Westerlund (2008) proposed the Durbin–H panel and group cointegration test, which gives more powerful results than any other panel cointegration test if there exists cross section dependence. The following equation is proposed by Westerlund (2007):

$$\Delta y_{it} = \delta'_i d_t + \alpha_i (y_{it-1} - \beta'_i x_{it-1}) + \sum_{j=1}^{pt} \alpha_{ij} \Delta y_{it-j} + e_{2,it} \quad (31)$$

where  $\alpha_i$  is error correction term,  $d_t$  shows deterministic trend,  $e_{2,it}$  is residuals. Durbin-H group and Durbin-H panel statistics are computed as follows Westerlund (2008):

$$DH_g = \hat{S}_i (\tilde{\phi}_i + \hat{\phi}_i)^2 \sum_{t=2}^T \hat{e}_{it-1}^2 \quad (32)$$

$$DH_p = \hat{S}_n (\tilde{\phi} + \hat{\phi})^2 \sum_{i=1}^n \sum_{t=2}^T \hat{e}_{it-1}^2 \quad (33)$$

$\hat{S}_i$  and  $\hat{S}_n$  are the variance ratios, and  $\hat{e}_{it-1}$  is a consistent estimate of  $e_{it-1}$ . Panel statistics,  $DH_p$ , is constructed by summing the  $n$  individual terms before multiplying them together. Group mean statistics,  $DH_g$ , is constructed by first multiplying the terms and then summing them up. The distinction lies in the formulation of the alternative hypothesis. The null and alternative hypotheses of Durbin–H panel and group cointegration tests are as follows:

$$\begin{aligned} H_0 : \phi_i &= 1 \text{ for all } i = 1, \dots, n \\ H_1^p : \phi_i &= \phi \text{ and } \phi < 1 \text{ for all } i \\ H_1^g : \phi_i &< 1 \text{ for at least some } i \end{aligned} \quad (34)$$

The Durbin-H panel cointegration results are compared with the critical value, 1.645. Our results indicate that there is cointegration for EU and candidate countries. Table 5 represents Durbin-H panel and group cointegration test results.

**Table 5: Durbin-H (2008) cointegration tests results**

	Test Statistics	Probability
Durbin-H group	3.309***	0.0000
Durbin-H panel	12.052***	0.0000

**Note:** \*\*\* indicates that the coefficient is significant at 1%.

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Our test results strongly support the long run cointegration relationship. It means that deviations from equilibrium value of the variable in the short run are corrected in the long run. Next, we estimate the long-run model for each country. Given that there is cross-sectional dependence in our series, we use Common Correlated Effects Mean Group (CCE-MG) estimators developed by Pesaran (2006). For the  $i^{\text{th}}$  cross section unit at time  $t$  for  $i=1,...,N$  and  $t=1,...,T$ , the linear heterogeneous panel data model is shown below Pesaran (2006):

$$y_{it} = \alpha_i' d_t + \beta_i' x_{it} + e_{3,it} \quad (35)$$

In (30),  $d_t$  is a  $n \times 1$  vector of observed common effects which includes deterministic components such as intercepts and seasonal dummies,  $x_{it}$  is a  $k \times 1$  vector of observed individual-specific regressors on  $i^{\text{th}}$  cross section unit at time  $t$ , and errors  $e_{3,it}$  are:

$$e_{3,it} = \gamma_i' f_t + \varepsilon_{3,it} \quad (36)$$

In (36),  $f_t$  is the vector of observed common effects which includes deterministic components such as intercepts and seasonal dummies  $\varepsilon_{3,it}$  are the individual-specific errors. Below, we present CCE-MG estimates.

**Table 6: CCE mean group estimates for unconditional convergence model**

	Coefficient	t-statistics	Implied $\lambda$	half life
$Y_{i,t0}$	-0.33418	-13.5791	0.019368	35.78757

Table 6 shows CCE-MG estimation results of unconditional convergence model. The investigation of unconditional convergence requires a restrictive assumption that there is no difference in preference, technology and steady state across countries. There is an absolute unconditional convergence observed because the coefficient of the initial level of real GDP per capita is negative and statistically significant. Countries with lower initial levels of relative GDP per capita tend to grow 0.33 per cent faster than rich ones.

The half life condition is given by  $e^{\lambda t} = 1/2 \Rightarrow t = \ln(2)/\lambda$ . It shows that how an economy fills the gap between others. Table 6 shows that countries with lower initial levels of relative GDP per capita will move halfway in 35 years. Implied  $\lambda$  is 0.019. It implies that 1.9 percent of the gap of initial levels of real relative GDP per capita between the rich and the poor vanishes in a year if their steady states are identical. The methodology also allows us to identify individual effects of independent variables on the dependent variable as well. Table 7 shows the country-specific convergence behavior.

Table 7 shows country-specific unconditional convergence behavior. From the table we see that all coefficients are significant and show unconditional convergence except Macedonia. Sweden has fastest unconditional convergence, and United Kingdom has lowest. The other countries with low unconditional convergence are Malta, Spain, Lithuania and Bulgaria, also France, Germany, Slovenia and Belgium have high unconditional convergence speed.

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**Table 7: CCE estimation results for each country (Unconditional convergence model)**

ID	$Y_{i,t0}$	Implied $\lambda$	Half-life
Austria	-0.38***	0.022764	30.44979
Belgium	-0.453***	0.028729	24.12719
Bulgaria	-0.246***	0.013446	51.551
Cyprus	-0.408***	0.024964	27.76562
Czech Republic	-0.378**	0.02261	30.65633
Denmark	-0.294***	0.016578	41.81102
Finland	-0.253***	0.01389	49.90259
France	-0.487***	0.031785	21.80755
Germany	-0.496***	0.032628	21.24422
Hungary	-0.433***	0.027019	25.6542
Italy	-0.317***	0.018155	38.17887
Latvia	-0.385***	0.023149	29.94261
Lithuania	-0.229***	0.012384	55.97056
Luxembourg	-0.305***	0.017326	40.00647
Netherlands	-0.288***	0.016175	42.8527
Poland	-0.257***	0.014146	49.00063
Portugal	-0.261***	0.014403	48.12609
Slovak Republic	-0.342***	0.019931	34.7774
Slovenia	-0.484***	0.031507	21.99973
Spain	-0.215***	0.011527	60.13135
Sweden	-0.633***	0.047733	14.52133
United Kingdom	-0.168**	0.008758	79.14238
Croatia	-0.327***	0.018858	36.75688
Malta	-0.213***	0.011406	60.77014
Turkey	-0.408***	0.024964	27.76562
Macedonia, FYR	-0.03	0.00145	477.888

**Note:** \*\*\* and \*\* indicate that the coefficient is significant at 1% and 5% respectively.

CCE-MG estimates show that there is a strong relationship. An absolute conditional convergence is observed because the coefficient on the initial level of real GDP per capita is negative and statistically significant. Countries with lower initial levels of relative GDP per capita tend to grow 0.49 percent faster than rich ones. And the other explanatory variables have expected signs except openness. We expect that openness effects economic growth positively, government consumption effects negatively, and agriculture effects positively as theory points out. On the contrary the theory openness has negative coefficient. This means that some of the EU and candidate countries are affected from openness negatively; these countries are Austria, Latvia, United Kingdom and Turkey. When we look at to the table 8, the coefficients on the percentage of activity in agriculture (because of the declining role of the agricultural sectors in these economies) are statistically insignificant. On the other hand, the methodology also allows us identifying individual effects of independent variables on the dependent variable as well. Table 9 shows that the coefficients of agriculture are statistically significant at 1% and 5% for 17 countries.

According to the half-life formula of conditional convergence model, countries with lower initial levels of relative GDP per capita will halfway in 18 years. And implied  $\lambda$  is 0.037. It implies that 3.7 percent of the gap of initial levels of real relative GDP per capita between the rich and the poor vanishes in a year if their steady states are identical. This is faster than the unconditional convergence model. It means that the explanatory variables at the conditional convergence model have good explanatory power for GDP per capita convergence.

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**Table 8: CCE mean group estimates for conditional convergence model**

	Coefficient	t-statistics
$Y_{i,t0}$	-0.49109	-7.64881
TRADE	-0.00053	-1.90897
AGRI	0.00308	0.789317
GC	-0.00483	-4.56452

Table 9 shows country-specific conditional convergence behavior. According as the table, countries with low unconditional convergence are Slovak Republic, Poland and Portugal; also Denmark, Finland, Lithuania and Belgium have high unconditional convergence speed. There is an interesting result exist here. In comparison with unconditional convergence model, here Lithuania has high conditional convergence speed. It was in the list of low unconditional convergence speed countries. It means that these additional explanatory variables in Table 9 have substantial effect on Lithuania economy.

**Table 9: CCE estimation results for each country (Conditional convergence model)**

ID	$Y_{i,t0}$	trade	Agri	gc	Implied $\lambda$	Half-life
Austria	-0.333**	-0.006***	0.016***	-0.012***	0.022498	30.80919
Belgium	-0.827***	0.001***	0.03***	-0.001	0.09747	7.111375
Bulgaria	0.058	0.000	0.002***	0.004***	-	-
Cyprus	-1.312***	0.003***	-0.006	-0.003***	-	-
Czech Republic	-0.5**	-0.002	0.01***	-0.001	0.038508	18.00
Denmark	-0.812***	-0.001	0.01***	-0.013***	0.092851	7.465177
Finland	-0.742***	-0.001	-0.006***	-0.005***	0.075266	9.209248
France	-0.805***	0.002***	-0.021***	-0.012***	0.09082	7.632118
Germany	-0.196	0.002***	0.032**	-0.008	0.01212	57.19141
Hungary	-0.328***	-0.001	-0.01***	-0.005***	0.022083	31.38804
Italy	-0.264**	-0.001	0.047**	0.001	0.017029	40.70351
Latvia	-0.47**	-0.002***	-0.002	-0.003***	0.035271	19.65203
Lithuania	-0.757***	0.000	0.004	-0.004	0.078594	8.819328
Luxembourg	-0.446***	0.000	-0.04***	-0.009***	0.032811	21.12572
Netherlands	-0.32	0.001***	0.026***	-0.005***	0.021426	32.35121
Poland	-0.149***	0.000	0.009***	-0.011***	0.008964	77.3299
Portugal	-0.177	0.000	-0.004	-0.002	0.010822	64.04881
Slovak Republic	-0.019	0.001***	0.024***	0.005***	0.001066	650.4075
Slovenia	-0.946***	0.001***	-0.017***	-0.012***	0.162154	4.274624
Spain	-0.656***	0.000	0.001	-0.008***	0.059284	11.69196
Sweden	-0.853***	-0.004	-0.004	-0.014***	0.106518	6.507329
United Kingdom	-0.473***	-0.002***	0.003	-0.001**	0.035586	19.47788
Croatia	-0.593***	-0.001	0.001	-0.002***	0.049941	13.87926
Malta	-0.314***	0.000	-0.038***	-0.006***	0.020938	33.1053
Turkey	-0.476***	-0.003***	0.014***	0.004	0.035904	19.30582
Macedonia, FYR	-0.058	0.000	0.000	-0.003***	0.003319	208.8142

**Note:** \*\*\*, \*\* indicates that the coefficient is significant at 1% and 5% respectively.

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## 5. CONCLUSIONS

This paper examines the tendency towards convergence in relative GDP per capita across EU and candidate countries, and investigates the effects of openness, economic activity and government consumption in the growth process for the period 1990-2011.

Our estimates of speed of convergence in accord with many other researchers' are high. We can justify it in the light of very sluggish EU growth rates of recent times. Besides, this speed is faster in conditional convergence model than the unconditional convergence model. It means that the explanatory variables at the conditional convergence model have good explanatory power for GDP per capita convergence for EU and candidate countries.

This paper gives country-specific conditional and unconditional convergence results at the long-run model via using Common Correlated Effect Model. This contribution provides crucial information about the European Union countries and candidate countries. These tests enable to see which countries have high, and which countries have low unconditional and conditional convergence. And also we can see the country-specific effects of explanatory variables.

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# **FINANCIAL, HUMAN, AND SOCIAL CAPITAL: WHAT MATTERS MORE FOR WOMEN'S MICROENTERPRISES? A CASE STUDY OF INDONESIA**

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**Abstract:** This study attempts to examine the impacts of microfinance on women's microenterprises' (WMEs) performance in Indonesia. It especially examines how financial, human and social capital matter for the enterprises performance. Data were collected from a survey conducted in Surabaya, the second largest city in Indonesia, from more than one hundred female micro-entrepreneurs who were members of a selected microfinance cooperative. The multinomial ordered probit analysis is applied to estimate the regression models. We find a negative relationship between loan size (financial capital) and profit. We also find that higher education level (human capital) and family involvement (social capital) are likely to bring better business performance.

**Keywords:** Microfinance, Women' Microenterprise, Business Performance

## **1. INTRODUCTION**

Microfinance has been claimed to have significant contribution in raising the standard of living for the poor and their hopes for breaking out of poverty. Evidence shows that the impact of microfinance is not only at individual and household level (DeLoach and Lamanna, 2011; Garikipati, 2008; Littlefield *et al.* 2003; Morduch, 1999; Nader, 2008), but even at country level (Hamada, 2010; Imai *et al.* 2012; Khandker, 2005; Matin *et al.* 2002; Mosley and Hulme, 1998). Originally, microfinance is designed to provide access to finance for the poor who generally have little or no valuable asset that can be used as capital or credit collateral. Relative to the formal banking credits, microcredits from microfinance institutions

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(MFIs) are informal and based mainly on trust, without strict collateral requirements or legally enforceable contracts (Yunus, 2008 cited in Johnston *et al.* 2008). Besides, as opposed to consumption, microcredits are usually offered for the neediest (poor women) to start up a new microenterprise or to expand the existing business (Microcredit Summit Campaign, 2000).

Given that the main goal of microfinance is poverty reduction via microcredits for business start-up/expansion, it is natural to ask if the goal is achieved. On the one hand, there are studies that report that microcredits benefits women's microenterprises performance (Copestake *et al.* 2001; Leach and Sitaram, 2002). Yet, on the other hand, the effectiveness of microcredit to mitigate poverty is challenged due to the findings that show microcredit alone could not successfully assist the poor to enhance their economic well beings in several countries/regions (Adams and Von Pischke, 1992; Cull *et al.* 2009; Dulal *et al.* 2008; Karnani, 2007). The effectiveness is even weaker for the poorest and those with very limited skills (Armendariz de Aghion and Morduch, 2005; Karnani, 2007). This is mainly because that these group of borrowers can seldom productively use the loans (Adams and Von Pischke, 1992; Imai *et al.* 2010). As a matter of fact, some studies even regard that microfinance may do harm to its participants (Buckley, 1997; Montgomery, 1996).

For a microenterprise – just like a business venture of any type – finance (microcredit) cannot be the sole ingredient in producing success. Other ingredients, such as human and social capitals, are also indispensable (Anthony, 2005; Bosma *et al.* 2004; Bradley *et al.* 2012; Cooper *et al.* 1994; Leach and Sitaram, 2002; Tundui and Tundui, 2012). The existence and interaction of these capitals should effectively enhance the performance for a microenterprise – without the right mixture of them business success would be difficult to be achieved. And, without a successful micro-business, poverty persists.

In light of the foregoing, microfinance has made considerable progress in making (financial) resources available to the bottom segments of the society (women, in particular) and offers them an opportunity to improve their living standard. Microfinance has a long history in Indonesia and is active in providing credits for the poor. However, the role of microfinance and its effectiveness in Indonesian women's microenterprises (WMEs) has not been properly investigated and this study aims to fill this gap. Specifically, this study is to provide an adequate understanding of the role of microfinance in the WMEs' performance in an urban area of Indonesia and the main research question is "what are the key determinants of Indonesian WMEs performance"? The investigation will be focused on how the financial, human, and social capitals affect the performance of WMEs in Indonesia. To address the question, a survey of microbusiness owners in Surabaya, the second largest city in Indonesia, is conducted and the survey data are analyzed via the multinomial ordered probit regression. Interestingly, we find that microcredit (loan size) has a negative relationship with profit. With regard to human and social capitals, we further find that higher education level appears to associate with better business performance, so does family involvement.

The remainder of this paper proceeds as follow. In Section 2, we briefly provide a country overview of Indonesia with focus on socio-economic and financial market condition as well as microfinance industry. We then continue with literature review in Section 3 and hypotheses linked to the research questions in Section 4. Section 5 describes the sample and reports empirical results with discussions. Section 6 concludes.

## 2. COUNTRY OVERVIEW

With the 2012 GNI per capita of US\$ 4,810, poverty remains the main problem in Indonesia. Although the proportion of Indonesians living with less than \$1.25 a day significantly reduced

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in the last two decades (ADB, 2013), about 18% of total population are still living below the international poverty line causing low level in some HDI<sup>1</sup> indicators (UNDP, 2013).

It also appears in the HDI as well as some gender indicators, such as participation in labor market; education; and shares in parliament, that female are lagging behind from their male counterparts. In addition, in business sector, a survey of small and medium enterprises (SMEs) in 10 cities in Indonesia conducted by IFC/NORC (2010) reveals that women headed firms were generally smaller than men's with 82% having a monthly turnover of IDR 50 million or less, compared to men with only 56%. In financial sector, the survey also provides evidence that women-headed firms were less likely to have a savings or deposit account (79% female/92% male), to have property insurance (5% female/13% male) or to have business loan (6% female/16% male).

The government has encouraged formal financial institutions, mostly commercial banks, to reach the unbanked by endorsing the national regulation of non-collateralized loans for microcredit<sup>2</sup>. Yet, it has confronted with two main constraints. Firstly, the smaller size of the country's financial sector compared to that of comparable countries (World Bank, 2010) limits the ability of the country's commercial banks to provide credits. Secondly, the traumatic effect of the 1998 Financial Crisis has motivated Indonesian authority to emphasize more on the practice of prudential banking, which then produces a prudentially sound but inefficient, narrow, and homogenized banking oligopoly (Beck and Al-Hussainy, 2010). These constraints contribute to the shallow outreach of the country's formal financial sector (see Table A in Appendix). With the exception of *Bank Rakyat Indonesia* (BRI) and *Bank Perkreditan Rakyat* (BPRs), the outreach of large of commercial banks participating in small credit market remains limited (Hamada, 2010)<sup>3</sup>. A study reveals that this lack of access to credit becomes a significant constraint to micro, small and medium enterprises (MSEs) (Rosengard and Prasetyantoko, 2011). As the country's commercial banks have limitations the outreach, microfinance has played a crucial role to handle such issues.

Indonesian microfinance industry is exceptionally old. It is made of a large variety of institutions, programs, services, clients, target groups and also subject to various legal, regulatory, and supervisory frameworks (Holloh, 2001). The country's microfinance industry is also one of the most commercialized in the world in term of its provision of sustainable microfinance with large scale and sustainability of outreach (Charitonenko and Afwan, 2003).

The commercialization might have two implications. Firstly, it stimulates MFI to do credit expansions widening access to finance. In contrast, secondly, the commercialization might also end up with a tighter the credit screening, leading to limit the access to the credits. In such case, Rosengard and Prasetyantoko (2011) reveals that there is still an unmet demand for microfinance services. Additionally, the interest rate charged on the loans is relatively higher for the borrowers even compared with that commonly charged by urban commercial banks. As a consequent, this increases the cost of borrowing, which potentially postpones new investments and worsens the borrowers' business profit unless the borrowers can reap even higher expected rate of return.

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<sup>1</sup> Human Development Index (HDI) is a composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living (UNDP, 2013).

<sup>2</sup> Central Bank of Indonesia (Bank Indonesia) defines microcredit as a loan below 50 million rupiah (equivalent with AUD. 5,000, if the exchange rate of AUD 1 = Rp. 10,000) provided by financial providers in Indonesia.

<sup>3</sup> A previous survey conducted by Johnston and Morduch (2008) revealed that most unbanked individuals in their research sample seek loans too small to be profitable at the going interest rate, even for an innovative micro lender like BRI. Thus, much of the problem of the unbanked in Indonesia rests not on their inability to service loans, but on financial providers covering the costs of lending.

## 3. LITERATURE REVIEW AND HYPOTHESES

### 3.1. Financial capital and enterprises' performance

At the earliest stage of an enterprise' life cycle, financial capital is the essential resource for purchasing fixed asset; working capital; as well as financing initial operation and living expenses for the owners. The amount of initial capital invested is positively associated to venture survival and growth (Cooper *et al.* 1994), because it enables entrepreneurs to invest in such productive activities, and have financial cushion to provide insulation against slow start-ups, market downturns, or managerial mistakes. Other studies also report that financial capital helps entrepreneurs to exploit business opportunities and accelerate business growth and survival in the subsequent stages (Bates, 1990, 1995; Bosma *et al.* 2004; Cooper *et al.* 1994; Cooper *et al.* 1988; Demircuc-Kunt *et al.* 2007; Holtz-Eakin *et al.* 1994).

Financial capital may come from various sources. In developed countries most start up finance is in the form of personal equity supplied by the entrepreneurs themselves (Parker, 2009). Meanwhile in developing countries, financial capital is mostly acquired from external sources, particularly in the form of debts. This is because the financial capital needed to start a micro business often exceeds micro-entrepreneurs' own savings or valuable possessions. As the business grows, the need of external finance should be replaced by the entrepreneurs' own savings and retained profits. However, the dependence on external finance is likely to persist, since the micro entrepreneurs are often unable to distinct their consumptions and business investment from their financing decision (Parker, 2009).

Moreover, those with lower credit scoring and inability of providing adequate collateral might be excluded from getting loans. In such case, Evans and Jovanovic (1989) agree with Knight's (1921) argument that those constraints bind and a would-be entrepreneur must bear most of the risk inherent with in his venture. The authors expect that those people are more likely to be constrained, and hence, they should be more unlikely to become entrepreneurs. A further study conducted in the late 1990s confirms that finance is the most important constraint for the micro and small enterprises (Kirkpatrick and Green, 2002).

In addition, female entrepreneurs are also experiencing more difficulties in financing their micro-business compared to their male counterparts. Banks and other mainstream credit institutions tend to favor men than women (IFC, 2012). Women tend to receive unequal treatment when dealing with such lenders (Parker, 2009; Pellegrino and Reece, 1982; Stevenson, 1986). Women also complain of gender bias in securing credits, so they had to provide higher collateral compared to their male counterparts (Hisrich and Brush, 1987; Hisrich and O'Brien, 1982; Humphreys and McClung, 1981). The lenders – the mainstream credit institutions – argue that men run larger businesses and seize larger control over assets that banks seek as collaterals (Armendariz de Aghion and Morduch, 2005). Other more reasonable explanations are that women are less likely to have relevant industry-specific experiences, thus women-owned firms are more likely to less successful according to economic measures of business success (Cooper *et al.* 1994; Fischer *et al.* 1993; GEM, 2010; Loscocco *et al.* 1991)<sup>4</sup>, and that women tend to ask for smaller and more regular loan causing the cost to the banks of lending to women may be high (van Staveren, 2001)<sup>5</sup>. Accordingly, the lenders often impose a higher interest rate on the loans or reject the credit applications. Such discrimination might hamper female entrepreneurs by restricting their

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<sup>4</sup> Studies comparing the performance of male and female-owned firms consistently show that businesses headed by women tend to be smaller than those headed by men, whether size is based on gross revenues, number of employees, sales, assets, or profit level (Fischer *et al.* 1993; Kalleberg and Leicht, 1991; Rosa *et al.* 1996; Watson and Robinson, 2003).

<sup>5</sup> Women apparently limit their business growth because they more consider about risks compared to men (Cliff, 1998)

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access to finance. This, thus, cause women to be more concerned about access to financial capital rather than with any other business problems (Fabowale *et al.* 1995).

Unlike conventional banks and other mainstream credit institutions with their conventional credit schemes, microcredits offered by microfinance institutions (MFIs) with minimal credit screening and without, or in some cases more flexible, physical collateral requirement. Although the cost of borrowing is still relatively high, this much easier credit scheme gives more access to finance for the unbanked. Microfinance has reportedly had positive implications in the poor households and business, as it may help them not only to cope with household vulnerability (Garikipati, 2008; Matin *et al.* 2002), but also give opportunity to start a micro-business and finance working capital and/or business expansion to gain profit growth (Copestake *et al.* 2001).

Notwithstanding the opportunities brought by microfinance to the neediest, for some MFIs with lending group scheme, credit screening is more often based on the trustworthiness of the individual and the number of ties to other group members. Thus, less attention is given to the business opportunity pursued (Armendariz de Aghion and Morduch, 2005). This easy credit screening added with lack of collateral result in higher risk to the borrower as a member of a lending group, since all members of the lending groups have to bear the credit risks. Although peer pressure may reduce this risk for the lender, personal or environmental shocks that impact the ability to conduct business can bring terrible consequences for the borrower individually (Bruton *et al.* 2011).

Furthermore, without overlooking the important role of financial capital in business development, Bradley *et al.* (2012) also reveal that microcredit does not always have direct effect on microenterprise' performance, but the relationship is significant if only mediated by the micro entrepreneurs' abilities to conduct innovations. Similarly, Tundui and Tundui (2012) document evidence that business skills even outstrip microcredits in affecting micro entrepreneurs' success.

It is also noteworthy that easy access to finance brought by MFIs, in some cases, could possibly lead to a decline in business performance in the medium or long term period. This might be due to that majority of microbusiness owners in developing countries have no sufficient knowledge and skills to conduct novelty innovations. Instead, they are more likely to be differentiation-related innovators (Bradley *et al.* 2012). They often make their outputs slightly different with, or even imitate, the innovators' outputs to capture a portion of the innovator's entrepreneurial profit, which is usually not much. While imitating entrepreneurs may at first serve to validate that market demand is indeed increasing, their continued entry, into the market increases competitive pressures (Hannan and Freeman, 1984), so that entrepreneurial profit would be divided among too many sellers (Schumpeter, 1934). Evidence of such decreasing marginal rates of return to microcredit has been found in Bangladesh (Mike Davis, 2006) and India (Dichter and Harper, 2007). Thus,

**Hypothesis 1:** Financial capital, in term of microcredits, will be negatively associated with women owned microenterprises' performance.

### 3.2. Human capital and enterprises' performance

Human capital refers to formal education; attitudes; and other human skills and abilities obtained through on-the-job trainings or business/industrial experience. It maintains that knowledge provides individuals with increases in their cognitive abilities, leading to raise productivity and efficient potential activity (Becker, 1964; Mincer, 1974; Schultz, 1959), and becomes important contributor to the individuals' future career or business success (Bosma *et al.* 2004; Cooper *et al.* 1994).

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As the center of the means and motives required to take action on opportunities (McMullen and Shepherd, 2006; Shane, 2003), human capital improves individuals' entrepreneurial judgment (Casson, 1995). Hence, if a profitable opportunity exists, individuals with more human capital should be better at perceiving them, and would also have superior ability in successfully exploiting the opportunities and finding ways to acquire the necessary resources (Timmons, 1990).

Education, a fundamental source of human capital, provides general human capital such as general search skill; foresight; imagination; computational and communication skills; as well as specific skills and knowledge (Parker, 2009), which are prerequisite to the specific human capital more often associated with on-the-job training. Several studies have observed the linkages between level of education and business. In 1990, for instance, Bates (1990) found that entrepreneurs who had a college education are less likely to fail than those who do not. The reason given is that education improves access of debt capital most directly for the commercial bank borrowers. Thus, in conjunction with financial capital, entrepreneurs' level of education contributes to the firms' survival. Other researchers also found that growth companies are more likely to be managed by entrepreneurs with college or higher degrees in Spain (Pena, 2002) and Finland (Kangasharju and Pekkala, 2002).

In contrast, Uusitalo (2001) argues that formal schooling does not appear to be linked with individuals' willingness to starting a business. He finds that more educated individuals are less likely to start their own business. Furthermore, entrepreneurship appears to be a character trait, which runs in the family. Thus, families seem to transmit their off-spring entrepreneurial skills and human capital, and that promoting entrepreneurship would require influencing people's attitudes. He also mentions that human capital, in the form of intergenerational links in self-employment and psychological factors<sup>6</sup> play a much larger role than formal schooling.

Expertise is another important dimension of human capital. In business context, expertise is shaped by both formal and informal trainings for skills needed to exploit opportunity (Shane, 2003). Expertise comes from two main sources, which are internal-family source and external sources.

From internal source, family is an important training ground for entrepreneurs. Family teaches an entrepreneur how to successfully communicate and motivate business associates (Gundry and Welsch, 1994). Thus, exposure to family business allows individuals to learn how to start and develop a business through the apprenticeship, because many of the skills necessary for decision making are not codified but are tacitly learned (Polanyi, 1966). In that way, if individuals have seen business ideas through family or close friends that have succeeded or failed, then their expertise in evaluating this opportunity will be greater (Amit *et al.* 1993). Such expertise would strongly influence individuals to become entrepreneurs. For example, Caputo and Dolinsky (1998) reported that having a self-employed husband is the single most important determinant of a woman being self-employed. Husbands are a source of knowledge and experience, and can also serve as role models for their wives. This implies that family apparently transmit the entrepreneurial skills to their members and offspring through employment experience in the family's business (Dunn and Holtz-Eakin, 2000). Other supporting evidence comes from Gimeno *et al.* (1997) stating that ventures founded by entrepreneurs from families with a history of entrepreneurship are less likely to fail, because they benefit from the proximity to entrepreneurial role models and emotional supports from their families.

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<sup>6</sup> Psychological characteristics become the main sources of certain entrepreneurial personalities (i.e. dynamic, self-confident, and less risk averse), which might be shaped by individuals' experiences (Kihlstrom and Laffont, 1979).

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From external source, prior knowledge from trainings and working experience enables entrepreneurs to increase their effectiveness during information gathering (Cooper *et al.* 1995), offers valuable knowledge about financing and developing the business, as well as raises confidence in opportunity exploration (Begley and Tan, 2001). Those should allow an entrepreneur greater freedom in exploring new combinations and doing innovations, either novelty-related innovation or differentiation related innovation<sup>7</sup>. Those also equip entrepreneurs with more ability to understand and handle business in uncertain condition, leading to improve outcomes (Bosma *et al.* 2004; Karlan and Valdivia, 2010). A study conducted by Loscocco *et al.* (1991) reveals that expertise from industry-specific experience is a major determinant of small business success.

In gender context, women are less likely than men to have education, experience with technical and managerial elements, prior work, and other type of business experience (Brush, 1992; Kepler and Shane, 2007). Women are more likely to enter a business without having a history of achievement, occupational training, or experience, and most often motivated by necessity (GEM, 2010). Unfortunately, possession of business skills and experiences has a positive impact on business profitability of WMEs (Tundui and Tundui, 2012). This confirms Coleman (2007)'s argument that beside education, working experiences are the main drivers of profitability in women-owned business. Thus,

**Hypothesis 2:** Human capital (i.e. education level, family business background and prior working experience) will be positively associated with women owned microenterprises' performance.

### 3.3. Social capital and enterprises' performance

Coleman (1988) defines the concept of social capital<sup>8</sup> as how the social structure of a group can function as a resource for the individuals of that group. It is embedded in the structure of relations<sup>9</sup> between actors and among actors. Social capital is, therefore, not lodged in individuals themselves, although they can make use of it to facilitate the production of individual or collective ends. It exists in trust; information; norms and effective sanctions; authority relations; and the extent of obligations in a group. Each is a feature of the social structure that also provides social capital as a resource for the individuals of the group.

In enterprise context, Granovetter (1985) offers the concept of embeddedness stating that enterprises are explained by structures of personal relations and networks of relations between and within enterprises. This concept highlights the importance of concrete personal relationships and networks of relationships in standard economy system. These networks provide access to resources, such as business financing; marketing advice; distribution channels (Hansen, 1995); employment, also offers psychological aids (Abell *et al.* 2001) as

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<sup>7</sup> Novelty-related innovation is concerned primarily with new sources of demand or supply. It emphasizes on what Schumpeter (1934) describes as five-forms of innovation: new products or services, new markets, new raw material, new method of production, and reorganisation of industry. Meanwhile, differentiation-related innovation is concerned primarily with how entrepreneurs position their products in relation to the competition. It focuses on how entrepreneurs have innovated to differentiate their products from incumbents. This implies that markets already exist and that entrepreneurial performance is a matter of outcompeting incumbents (Bradley *et al.* 2012).

<sup>8</sup> In earlier years, Bourdieu (1983) defines social capital as the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition.

<sup>9</sup> Relations (ties) can be of many different types, which include friendship or other emotional ties; transfers of material resources, or exchange relationships; proximity in space, such as neighbours or office mates; and kinship relations (Wasserman and Faust, 1994); as well as membership in voluntary associations (Paxton, 1999).

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well as information and advice (Hoang and Antoncic, 2003), that can be mobilised to facilitate entrepreneurial actions (Adler and Kwon, 2002).

The benefits of social capital are not only in terms of facilitating access to broader business sources; influences; and gaining power or controls, but also solidarity, which then be transformed into social supports from others (Adler and Kwon, 2002). This social support includes both in the structures of an individual's social life (e.g. group membership and/or family relationship) and the functions that these structures may serve (e.g. emotional support and instrumental assistance). It can be received through work domain (Allen, 2001) and family domain (King *et al.* (1995). The both domains can be highly interrelated in entrepreneurial context (Aldrich and Cliff, 2003), because entrepreneurs can more easily transfers or share of resources between the domains compared to organizational employees (Powell and Eddleston, 2013).

*Strong ties.* Coleman (1988) suggests that family is seen to be an ideal environment to create social capital. There is a greater likelihood that family and close friends will be socially involved with one another, forming a higher density network of relational lines (Granovetter, 1982). This, thus, creates strong ties.

As a fruit of strong ties, family supports range from a spousal emotional supports (Gudmunson *et al.* 2009) to employing family members (Cruz *et al.* 2012; Kim and Gao, 2013). Evidence shows that family support positively affect entrepreneurs' business survival, sales and profit growth (Bosma *et al.* 2004; Bruderl and Preisendorfer, 1998). It is also of the key entrepreneurial success for female entrepreneurs (Powell and Eddleston, 2013).

While in developed economies, entrepreneurs often rely on strong ties at founding, particularly for funding; emotional supports (Gimeno *et al.* 1997; Shane, 2003); and continuing the formation activities (Davidsson and Honig, 2003), reliance on strong ties in developing economies has an additional reason. A distrust of institutions and lax enforcement of contracts require greater reliance on strong tie family networks or close trust relationships for a wide range of economic activities (Humphrey and Schmitz, 1998; Zacharakis *et al.* 2007). Moreover, financial and material resources deficiencies cause micro entrepreneurs become less attractive as employers (Williamson, 2000). This forces them to employ their family members (Aldrich and Langton, 1997; Scase and Goffee, 1987; Wheelock and Baines, 1998). In such case, Cruz *et al.* (2012) report that employing family members would partly improve business performance for women-led firms in Dominican Republic. However, this involvement harms their firms' performance when the business is of the main resource of household income. In addition, evidence from India shows a positive effect of spousal support on local Indian female micro-entrepreneurs (Leach and Sitaram, 2002). It reveals that microcredits provided to them are able to increase their household income, if only their spouses get involved in the businesses.

Nevertheless, family involvement may also have no direct effect on firms' performance (Kim and Gao, 2013). In the case of small family firms with low assets, family involvement may raise agency costs, especially when there is a lack of formal monitoring system and if the family members want to pursue their own self-interest by using the firm's assets leading to drain the firm's financial and other resources, and deteriorate the firms performance (Dyer, 2006; Tundui and Tundui, 2012). Reliance only on strong ties may also cause limitations of potential resources and market size that an extra-community network might provide (Woolcock, 1998).

*Weak ties.* Weak ties are loose relationships, lower density of relational networks of individuals outside family and close friends (Granovetter, 1982). Individual's informal relations with acquaintances and other types of network ties can create social capital through



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increased communication, information diffusion, and social supports (Paxton, 1999). In addition to those informal relations, individuals can be tied to others through formal membership in voluntary associations.

Thus, weak ties provide alternative sources of information that might not be directly available to a particular individual. Access to additional information can be combined with current knowledge to discover or create non-obvious opportunities in the market (Shepherd *et al.* 2007). Entrepreneurs frequently make decisions as a result of associations based on friendship or advice (Paxton, 1999), and high supports from these ties are positively related to sales growth (Bruderl and Preisendorfer, 1998).

Furthermore, although it is still debatable, several studies show that female entrepreneurs generally have smaller and are more likely to include family in their social networks compared to male entrepreneurs (GEM, 2010; Loscocco *et al.* 2009; Marsden, 1987). Hence, the weak ties may benefit female entrepreneurs by offering broader and more heterogeneous networks, which may encourage the entrepreneurs to exploit business opportunity (Renzulli *et al.* 2000). The heterogeneous networks are then more likely important for the viability and growth of women's than men's businesses (Loscocco *et al.* 2009). Accordingly, becoming member of associations or organizations, such as microfinance lending group, might be beneficial for female entrepreneurs. In this context, Anthony (2005) suggests that participation in lending group may give some advantages. Interactions among the group's members provide them with opportunities to develop new or deepen already existing social relationships within the group that may yield economic gains, increase the likelihood of loan repayment, as well as benefit the borrowers with valuable information of opportunities that may lead to arbitrage of business ideas. Thus,

**Hypothesis 3:** Social capital (i.e. strong ties, week ties and lending group) will be positively associated with women owned microenterprises' performance.

## 4. METHODOLOGY

### 4.1. Data and sample

This study's population is female micro entrepreneurs who are member of microfinance institution in urban area of Indonesia, and the sample obtained from a selected MFI which operates City of Surabaya and its surrounding area. Surabaya was picked as the sample because it is the Indonesia second largest city with multi-cultural population and the capital of East Java Province, which is the second most populated province where the micro and small-medium enterprises' contribution to its regional Gross Domestic Product has increased since 2003 and reached 53.40% in 2007.

The selected microfinance institution is a women-cooperative established in 1978 in the City of Surabaya. The institution has 379 operating microcredit lending groups and approximately 10,900 women participating. It has both savings and co-guaranteed loan programs. In 2010, the loans outstanding were approximately 13.4 million USD (Rp. 133.7 billion) with loan sizes ranging up to 2,500 USD (Rp. 25 million). The amount of loan received by a member is depended on the amount of member's deposit and her group credit limit. Group membership and loan size is based on both the advice of a loan officer and the decision of other group members.

The survey was conducted in May of 2010. Before conducting the survey, the original English language questionnaire was carefully translated into the Indonesian language. Two to three members were then randomly selected from each group, which were randomly selected from the MFI for survey, with the qualification that they own a business. They were

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then contacted for their voluntary participation with most surveys conducted at their residential or business premises to observe their real-life conditions and less frequently at their group meeting. After completing the questionnaires, the fieldworkers, who were all university students, inputted the answers into the database with their supervisor subsequently verifying the data. This effort provided a total of 168 Indonesian respondents. However, as we exclude the unmarried respondents from the sample, the total sample unit for the further analysis reduces to 141 only.

### 4.2. Variables

We use profit and sales as measurements of *business performance* representing the outcome of micro enterprises. In this research, those are measured by the respondents' subjective self-reported of change both in profit and sales (i.e. decrease/about the same/increase) in current year compared to a year period before. We use such subjective measurements because micro entrepreneurs often do not appropriately record their business transactions, and in most cases, they do not even know how to do it. Thereby, to get the accurate amount of the business profit and sales are almost not possible since transaction records and financial statements are mostly unavailable. Although, a subjective self-reported performance measure is not too ideal and often biased by the respondent subjectivity, it is still reliable and common in most literature (Anna *et al.* 2000; Chandler and Hanks, 1993; Cruz *et al.* 2012; Watson and Robinson, 2003; Wiklund and Shepherd, 2003), as well as highly correlated with objective data (Dess and Robinson Jr, 1984).

The independent variables consist of financial capital (*FCap*), human capital (*HCap*), and social capital (*SCap*). *Financial capital (FCap)* is operationally defined as the current amount of micro-credit outstanding owed by the individual respondent. Human capital consists of three indicators, which are educational attainment, family business background, and prior working experience. *Educational attainment* is measured by the level of formal education of the respondent ranging from elementary school to university/college. *Family business background* is a dummy variable of whether the respondent has parents or family members who run at least a business. *Prior working experience* is also a dummy variable of whether the respondent has prior working experience with the same type of business she owns.

Finally, the social capital comprises strong ties, weak ties and lending group. The *strong ties* is in term of family involvement measured by whether the respondent is able to get her family involved with her business either formally or informally. The *weak ties*, meanwhile, is measured by the number of business acquaintances (i.e. consumers and suppliers) involved with the business. The term of involvement is defined as participation, such as discussion about business ideas; get formally or informally employed; and providing helps or supports in the business. The *lending group* can be either strong or weak ties, however we separate the lending group from the both ties because we explicitly want to capture the role of the lending group in the respondents' business performance. Lending group variable is the number of people in the respondents' lending group.

Some control variables (*Z*) include change in asset, competition, number of employees, new product and age. *Change in asset* as a proxy of business expansion measured by subjective self-report of change in the enterprise's assets. *Competition* is a dummy of whether the respondent aware of any competing firms that sell the same product or services in her surrounding area. It is to capture the level of competition for opportunities. *Number of employees* is the current employees working in the business. *New product* is the respondents' perception of the newness of her product measured by a question of how much she agrees that the product or service she is offering is new to the local market. Finally, *age* is the age of the respondents.

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## 4.3. Model Specification

To solve the research question, the multinomial ordered probit estimation will be employed to estimate the model, since the dependent variable is in limited categories, which are ordinal in nature. The estimation model can be written as:

$$PERFORMANCE_i = \beta_0 + \beta_1 FCap_i + \beta_2 HCap_i + \beta_3 SCap_i + \beta_i Z'_i + \varepsilon_i \quad (1)$$

where  $\varepsilon_i$  is the error term.

## 5. EMPIRICAL RESULTS AND DISCUSSION

### 5.1. Empirical Results

Table 1 provides descriptive statistics of the dataset. Table 2 presents the results of the ordered probit models estimating business performance, measured by changes in profit and sales. Model 1 and Model 4 are baseline control models. We include controls and all covariates, except microloan and lending group, in Model 2 and Model 5 for predicting profit and sales respectively. This is specially designed to examine the role of the variables to the business performance in the absence of microfinance programme. Finally, Model 3 and Model 6 are the complete models as we include all covariates and controls in the models.

In hypothesis 1, it is hypothesized that financial capital, in the form of microloan/microcredit, has negative association with business performance. Table 2 shows that the hypothesis is partially supported, since microloan negatively affects profit ( $b = -0.0410$ ;  $p < 0.10$ ), but not sales. It reveals that each amount of loan decreases chance of increase in profit by 4.10 percentage point.

For hypothesis 2, the results show that only education has significant effect on the performance. Model 2 and Model 5 point out that, in the absence of microfinance (i.e. microloan and lending group), education positively associates with both profit ( $b = 0.2715$ ;  $p < 0.05$ ) and sales ( $b = 0.2002$ ;  $p < 0.10$ ). However, the presence of microfinance variables cause the significant relationship between education and sales disappears, as well as weaken the education's chance to increase profit ( $b = 0.2398$ ;  $p < 0.10$ ) by 11.67 %.

Hypothesis 3 that social capital has positive relationship with performance is also partially confirmed. The constancy of strong ties, in term of family involvement, in supporting micro enterprises performance appears both in Model 2 ( $b = 0.1538$ ;  $p < 0.05$ ) and Model 3 ( $b = 0.1510$ ;  $p < 0.05$ ) for profit, but not in Model 5 and Model 6 for sales. The results also reveal that the other social capital variables (i.e. weak ties and lending group) are not significantly linked to the performance.

Finally, for control variables, it seems that change in asset and the micro entrepreneurs' awareness of competition are consistently associated with business performance improvement. Moreover, the ability of micro entrepreneurs to produce or sell products that are new in local market is more likely to increase sales ( $b = 0.2139$ ;  $p < 0.10$ ), but not profit.

### 5.2. Discussion

Microfinance has been claimed to have important contribution in poverty alleviation programme in some developing economies. It helps the poor to cope with their household vulnerability by offering non-collateralized loans that can be used to overcome income socks. However, the main and initial goal of microfinance is not providing loan for non-productive or consumption purposes, but for helping the poor to establish their own income generating

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activities so they can get better incomes to increase standard of living. In such case, many studies have found various results, especially if the studies are aimed to investigate the role of microfinance in microenterprise performance. Compared with other studies reporting positive contribution of microfinance to the firm performance, our study finds somewhat different results.

With regard to financial capital, most business literatures agree that financial capital is the essential feature of business success. It is believed that the capital may help entrepreneurs to initiate and expand their business. However, different sources of the financial capital may have different effect on the business results. For instance, unlike developed economies, most financial capitals in poor countries are in the form of indebtedness. In the case of microcredits offered by MFI, this indebtedness is relatively high risk. The risks may even higher with the absence of physical collaterals. The higher risk causes higher credit interest rate. This can be a significant problem if the business returns cannot sufficiently cover up the interest costs.

In our study, we find that the microcredit has a negative relationship with the WMEs' profit, meaning that higher levels of indebtedness decrease the likelihood of the business being profitable. We suspect that this due to some reasons. Firstly, we tend to agree with the argument that decreasing marginal rate of return is likely happened in microcredits (M. Davis, 2006; Dichter and Harper, 2007). The relatively easy access to finance gives the women more chances to apply for the credits. Suppose the women can effectively use the credits for financing their business, this will improve their firms' capacities to produce more outputs. However, as majority of micro entrepreneurs in developing countries are usually unable to conduct novelty innovation (Bradley *et al.* 2012)<sup>10</sup>, they are more likely to slightly differentiate their outputs from, or even imitate, the existing outputs made by the innovators rather than to develop brand new products for the local markets. Consequently, it increases supply of relatively similar products in the market leading to increase competitive pressure. This will potentially decline the profits obtained by the individual entrepreneurs especially when the market demand is relatively stable. Secondly, although there is not enough data to support – and therefore needs to be proven with further research, we suspect that the women use the credits for other purpose instead of business purpose (Adams and Von Pischke, 1992; Imai *et al.* 2010). There is always a chance that the women might use the credit for consumption or dealing with their household vulnerability (Garikipati, 2008). Thus, increasing loan size suggests greater personal or household expenditures rather than business development (Morduch, 1999). Finally, we argue that the lack of pre-planning prior the business start-up may carry undesirable consequences in the subsequent periods. We found that only around 30% of total respondents made sufficient business plans before initiating the businesses. Our logic also suspects that the causality issue may exist in this case. It might be true that the loan deteriorates business performance, however it is also possible that bad business performance drives higher loans. Further research with a longitudinal data set is suggested to address such issue in future time.

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<sup>10</sup> Our study also reveals that ability of the entrepreneurs to produce or sell new products in local market is positive related to sales, but not profit. This might be reasonable because profit is not only associated with sales but also with costs. For example, if the sales is high but the costs are also high or even higher, the profit will then not be better off.

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**Table 1: Statistic description and correlations of variables**

	MIC	EDU	PWE	FBB	FI	WT	LG	CiA	C	NoE	NP	A	P	S
Microloan	1													
Education	-0.18	1												
Prior working experience	-0.20	0.04	1											
Family business background	0.07	-0.10	0.18	1										
Family involvement	-0.07	0.13	-0.07	0.00	1									
Weak ties	-0.05	0.09	-0.24	-0.10	0.10	1								
Lending group	0.05	-0.02	0.19	0.04	0.11	0.04	1							
Change in asset	0.01	0.06	-0.05	-0.09	0.14	0.03	-0.08	1						
Competition	0.13	0.09	-0.05	-0.03	-0.19	0.07	-0.09	-0.02	1					
Number of employees	0.22	0.06	-0.14	-0.02	-0.03	0.01	0.10	0.10	0.09	1				
New product	0.18	-0.03	-0.01	-0.01	-0.18	0.00	0.03	0.18	-0.13	0.06	1			
Age	0.21	-0.20	-0.11	0.14	-0.11	0.23	0.00	-0.01	-0.06	0.04	0.04	1		
Mean	11.31	3.21	1.57	1.45	5.19	0.15	31.56	5.50	0.64	3.01	1.99	47.90	2.30	2.18
Median	11.00	3.00	2.00	1.00	6.00	0.00	30.00	0.00	1.00	2.00	2.00	48.00	2.00	2.00
Maximum	30.00	5.00	2.00	2.00	7.00	1.00	50.00	60.00	1.00	21.00	7.00	66.00	3.00	3.00
Minimum	0.75	1.00	1.00	1.00	1.00	0.00	16.00	-75.00	0.00	0.00	1.00	30.00	1.00	1.00
Std. Dev.	4.62	0.86	0.50	0.50	1.66	0.36	8.12	20.22	0.48	3.62	0.95	8.69	0.76	0.80
Observations	141													

**Table 2: Ordered probit models**

Variables	Change in PROFIT			
	Model 1	Model 2	Model 3	
<i>Financial Capital</i>				
Microloan			-0.0410	(0.0239)*
<i>Human Capital</i>				
Education		0.2715	(0.1221)**	0.2398 (0.1241)*
Prior working experience		0.1685	(0.2222)	0.0364 (0.2339)
Family business background		-0.1061	(0.2113)	-0.0872 (0.2122)
<i>Social Capital</i>				
Family involvement		0.1538	(0.0665)**	0.1510 (0.0678)**
Weak ties		-0.0241	(0.3172)	-0.0735 (0.3216)
Lending group				0.0171 (0.0139)
<i>Business control</i>				
Change in asset	0.0248	(0.0056)**	0.0235	(0.0058)** 0.0243 (0.0060)**
Competition	0.3995	(0.2071)*	0.5094	(0.2194)** 0.5766 (0.2243)**
Number of employees	0.0249	(0.0297)	0.0234	(0.0298) 0.0269 (0.0306)
New product	-0.0363	(0.1058)	0.0291	(0.1107) 0.0564 (0.1135)
<i>Individual control</i>				
Age	-0.0071	(0.0115)	0.0031	(0.0126) 0.0066 (0.0129)

**Notes:** Unstandardized coefficients as well as standard error in parentheses are reported. Number of observation (n) = 141. \*p<0.10; \*\* p<0.05

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**Table 2: Continued**

Variables	Change in SALES		
	Model 4	Model 5	Model 6
<i>Financial Capital</i>			
Microloan			-0.0221 (0.0237)
<i>Human Capital</i>			
Education		0.2002 (0.1213)*	0.1888 (0.1231)
Prior working experience		0.0884 (0.2153)	-0.0336 (0.2270)
Family business background		0.0385 (0.2059)	0.0642 (0.2077)
<i>Social Capital</i>			
Family involvement		0.1056 (0.0649)	0.0939 (0.0662)
Weak ties		-0.3617 (0.3038)	-0.4318 (0.3097)
Lending group			0.0208 (0.0135)
<i>Business control</i>			
Change in asset	0.0234 (0.0055)**	0.0229 (0.0056)**	0.0246 (0.0058)*
Competition	0.3097 (0.2050)	0.3877 (0.2146)*	0.4352 (0.2194)*
Number of employees	-0.0172 (0.0270)	-0.0162 (0.0276)	-0.0182 (0.0284)
New product	0.1503 (0.1078)	0.2033 (0.1127)*	0.2139 (0.1160)*
<i>Individual control</i>			
Age	-0.0104 (0.0112)	-0.0077 (0.0121)	-0.0067 (0.0123)

**Notes:** Unstandardized coefficients as well as standard error in parentheses are reported. Number of observation (n) = 141. \*p<0.10; \*\* p<0.05

Regarding the human capital, the results suggest that formal education has a vital role in improving profits, although the presence of microfinance programme may slightly reduce its effect. Higher level of education is more likely to increase the chance of increasing profits, because it might equip the women with better general skills, as well as computational and communication skills for doing business (Parker, 2009). On the contrary, having prior working experience and/or family business background does not appear to increase the women's chances of having better business performance. This might be due to that the entrepreneurs' parents/families might not successfully transmit their off-spring entrepreneurial skills, or that the parents indeed transferred such skills to them, but the skills might not be sufficient to cope with the current business conditions faced by the entrepreneurs. It is thus clear that the results somewhat challenge those of Uusitalo (2001).

For social capital, strong ties (i.e. family involvement) consistently contribute to the profit, but not sales. Family involvement does not only benefit the women with less expensive employment (Aldrich and Langton, 1997; Scase and Goffee, 1987; Wheelock and Baines, 1998), but also provide them with other advantages, such as emotional support, networking, and training ground (Caputo and Dolinsky, 1998; Gudmunson *et al.* 2009; Gundry and Welsch, 1994; Leach and Sitaram, 2002). This strong ties apparently assists the women micro entrepreneurs who often stress their desired for synergy between work and family (Bird and Brush, 2002; Brush, 1992).

Our study, however, reveals that weak ties does not seem to be important factor for the women's business. The involvement of acquaintances does not seem to significantly

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contribute to the WMSs performance. Moreover, the lending group variable does not significantly affect both profit and sales. We find the involvement of the women in lending groups is pragmatically motivated by the purpose of obtaining loans. Most of the respondents said that conversations among the group members during the groups' meetings are dominated by loan repayment issues. There is very limited time allocated to facilitate the members to talk about their business in the regular group meetings, consequently it confines the members to gain valuable information of opportunities that may lead to arbitrage of business ideas. It seems that the members are not able to optimally use the lending groups as a beneficial instrument for business growth, except for getting loans only. In this case, a lending group may expand social network, but not yet to build a solid business network that significantly supports the growth of its members' businesses.

### 6. CONCLUSION

This study finds that microcredit is negatively associated with the borrowers' business profits. The presence of the diminishing marginal rate of return in microcredits, lack of discipline of the women in using the loans, as well as the inability of the entrepreneurs to make adequate pre-planning prior the business establishment might be the reasons behind the relationship. It is also revealed that lending group variable does not significantly contribute to business performance, although they might benefit the women with broader social networks. On the other hand, the women's education and family involvement do matter for the micro-enterprises' profits.

Overall, our findings suggest that microfinance alone is apparently not a perfect tool to improve the WMEs performance, as we find that the other capitals outstrip its role. Accordingly, in this case, we somewhat agree with other research (Adams and Von Pischke, 1992; Armendariz de Aghion and Morduch, 2005; Karnani, 2007; Tundui and Tundui, 2012) stating that giving microcredits to help women micro entrepreneurs who lack of human and social capitals will not be effective.

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## APPENDIX

**Table A: Access to and use of financial services in Indonesia and selected Asian developing countries, 2011**

	India	Bangladesh	Indonesia	Philippines	Viet Nam	Thailand	Malaysia
Commercial bank branches per 100,000 adults	10.64	7.85	8.52	8.07	3.63	11.29	10.49
ATMs per 100,000 adults	8.90	3.56	16.47	17.70	20.03	77.95	56.43
Outstanding deposits with commercial banks (% of GDP)	68.43	65.63	43.36	41.93	136.37	78.79	130.82
Outstanding loans from commercial banks (% of GDP)	51.75	54.32	34.25	21.39	135.91	95.37	104.23
Deposit accounts with commercial banks per 1,000 adults	953.06	539.81	623.74	492.78	n/a	1414.30	1642.23
Loan accounts with commercial banks per 1,000 adults	142.02	93.69	216.74	n/a	n/a	311.92	612.21
Household deposit accounts with commercial banks per 1,000 adults	853.02	425.33	603.37	n/a	n/a	1353.04	n/a
Household loan accounts with commercial banks per 1,000 adults	20.62	79.86	213.81	n/a	n/a	297.11	578.21

**Source :** IMF (2013) Financial Access Survey: Key Indicators.

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# **IMPACT OF FOREIGN ENQUITY ON INNOVATION AND PERFORMANCE OF LISTED HIGH-TECH COMPANIES WITHIN AND OUTSIDE CLUSTERS IN CHINA<sup>\*</sup>**

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**Abstract:** Based on the data of 188 GEM-listed companies until 2012, this paper uses principal component regression analysis to compare disparities in creative, learning and factor input capacities by dividing samples into a cluster group and a non-cluster group. The results indicate that companies within clusters easily access government supports, attach importance to learning effects, demonstrate greater capabilities to absorb skills and know-how spilled over from foreign investment companies, and experience less impact due to crowd-out effects caused by foreign capital. Endogenous creation within clusters with little contribution to performance implies that superiority of resource agglomeration and learning networks have not converted into creative superiority. Companies outside clusters place greater emphasis on exogenous innovation driven by foreign capitals than do companies within clusters. We propose that, lacking capital and technical stock, governors should pay more attention to exogenous creative sources, accelerate the industrialization process of creative achievements through training and technical exchange and establish technical service platforms.

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**Keywords:** Principle Composition Analysis, Endogenous Creation, Exogenous Creation, FDI Efficiency Spillovers

## 1. INTRODUCTION

In China, numerous clusters have emerged and have been promoted by local governors as part of the Regional Economic Strategy since the promulgation of the Twelfth Five-year Plan to develop National Strategic Emerging Industries by the State Council in 2012. Local governors have established industrial and high-tech parks aimed to attract high-end external capital and have built industrial chain associations to stimulate technique transfer and spillover and to upgrade traditional industries. The development of the regional economy highly depends on FDI efficiency spillovers and cluster innovation. Based on principle composition analysis, this article compares the contribution of innovative factors, such as foreign equity, talents, education level, R&D investment and government support of high-tech entities within and outside clusters sampled by GEM listed companies, as it examines the following three issues. (1) The first concern is cluster innovation and foreign equity, which may become dependent routes for the development of high-tech entities. (2) The second issue is whether the existing cluster innovation acquires know-how mainly due to its endogenous nature, that is, through FDI spillovers with a high dependence on foreign capital, or due to its exogenous nature, which is based on local capital and techniques that are highly dependent on independent research and development. (3) The third issue is whether foreign equity within clusters first plays a direct role on performance or on creative capacity, which indirectly impacts operation performance. In section two, we review previous literature with the aim of distinctly defining innovation-driven cluster. In section three, we shape the development stages and explain the situation of clusters in China. Sections four and five present our data sources, model choice, empirical tests and results. In the final section, we present our conclusion and offer policy suggestions.

## 2. LITERATURE REVIEW

### 2.1. Cognition of innovation driven clusters

In 2001, the Ministry of Science and Technology put forward the strategy of the "second innovation" by expanding the national high-tech zone to improve industrial clusters and foster innovation. Innovation-driven clusters became the key means in regional innovation to upgrade existing industrial clusters into high-end centers. Innovation-driven clusters are vital for attracting foreign direct investments (FDIs) and promoting FDI efficiency spillovers through the convergence of creation-related resources. This gives rise to several questions, however. What roles do foreign equities play in existing cluster creation activities? Is the channel to stimulate FDI efficiency spillovers in clusters to drive business performance direct or facilitative? What are the critical principles for identifying the significance of locations characterized by clusters upon consequences of FDI efficiency spillover.

Mytelka and Farinelli (2003) argue that innovative clusters are consistent with Porter's defined informal clusters, which, as the highest type of cluster, exhibit a highly developed nature. Xiao (2003) defines innovation-driven clusters as chains formed by know-how centers consisting of customers, suppliers, universities, intermediary organizations and other knowledge-intensive services. Luo *et al.* (2003) regard innovation-driven clusters as wonderful platforms for the cultivation of creation, and as an existence mode of innovation as they provide innovative individuals with demand enforcement, survival paradigms and resource supports. Li (2004) defines an innovation-driven cluster as a regional network formed by a group of common and complementary innovative enterprises and associated institutions rooted in a certain area within one specific industry and comprised of a relatively stable system based on formal or informal long-term cooperations and exchanges among enterprises, universities, local governments, scientific research institutes and other institutions or individuals. Based on this,

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Li (2012) concludes that innovation-driven clusters as technical and economic networks are characterized by an agglomerative economy and knowledge outflow that constantly drive clusters towards the global high-end chain.

Drawing from the above definitions, we define innovation-driven clusters as advanced forms of clusters that focus on creation and emphasize interactions and knowledge flows across innovative subjects characterized by a high degree of trust and industrial links between entities that foster cooperation and competition within clusters. Cluster enterprises have the capacity to continuously innovate based on resources, including know-how and techniques, and lead the whole cluster to integrate into the global high-end value chain.

### 2.2. Relationships among FDI efficiency spillover, cluster and performance

There are three academic views on relationships among FDI spillover, cluster and business performance. One is the positive view. Cooke *et al.* (1985) posit that an agglomerative economy, institutional learning, joint management, proximity capital and interactive creation are vital to the generation, diffusion, application and development of knowledge. The agglomeration economic theory represented by Porter argues that scaled economies, positive externalities and scope economy generated by clusters bring about external advantages characterized by efficiency spillovers for industries. Nachum *et al.* (2003) compare cluster and non-cluster groups and find that cluster innovation networks contribute more to business performance. Djankov *et al.* (2000) show that foreign capital positively improved the total factor productivity in the Czech Republic and Slovakia. Yao *et al.* (2007) confirm that FDIs bring advanced management skill and production technology to new industrial economies, which is conducive to elevated industrial efficiency and local productivity. Qu *et al.* (2013) verify that local absorptive capacity determines the magnitude of the role of FDI on local innovative achievement. Qu (2012) compares cluster and non-cluster enterprises and finds that a cluster network facilitates the establishment of close and exoteric contacts among cluster entities, thereby enhancing the learning abilities and improving business performances of the cluster entities. The second view contends that FDI spillovers are conditionally generated. Blomstrom and Kokko (2000) suggest that the ability of domestic companies to absorb FDI technology spillover depends on indigenous know-how stock. Linda (2007) argues that in the financial sector, FDIs can speed up the economic growth of the host country on the premise of perfect information transfer, technical progress and venture management. Based on manufacturing data of OECD nations, Ramasamy and Yeung (2010) confirm that foreign capital agglomeration is more important than market size and human capital in the host country. Tanaka *et al.* (2012) find that in the delta of the Yangtze River of China, FDIs assume a positive role on local business performances, and more significantly promote development of entities in near proximity over a longer distance. Gugler and Brunner (2007) believe that clusters exert an important influence on the capacity to absorb FDI technology spillovers. The third is a negative view. Grabber (1993) argues that, for value-added segments in innovation, design and research and development concentrate in the home office, foreign enterprises in clusters are created with low technical content, engaged with poor autonomy and poor relationships with the host markets, businesses and consumers. Furthermore, this view purports that FDI devote less to upgrade of local technologies.

Few studies have focused on the impacts of FDI efficiency spillovers on business performance according to the profiles of innovation-driven clusters. Furthermore, academic conclusions on relationship among FDI spillover, clusters and performance are not consistent, though FDIs are found to affect the production modes and market statuses of cluster enterprises through the cluster network. Cluster enterprises establish up-and down-stream industrial links with multinational entities and acquire FDI efficiency spillovers by demonstration-and-imitation effect, thereby upgrading techniques and management skills and shaping complementary advantages. Yang *et al.* (2007) study the Tianjin Binhai New Area and consider clusters as models of regional innovation and posit that cost-effective clusters

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with complete and agglomerated supporting industries can attract FDIs and further upgrade clusters through the role of FDI technology spillovers and managerial demonstration. Accordingly, clusters and FDI spillovers are effective paths to realizing regional innovation. Therefore, the effects and channels of FDI spillovers in existing Chinese clusters require further examination.

### 3. DEVELOPMENT HISTORY AND STATUS OF CLUSTERS IN CHINA

Cluster development in China experiences three stages: spontaneous agglomeration, national planning and innovation upgrades. The spontaneous agglomeration stage (from the late 1970s to 1989) consisted of manual mills and small and medium enterprises mainly engaged in the manufacturing of handicrafts, the assembling of parts and the creating of clothing textiles. Examples include the agglomeration of small objects in Yiwu and Zhejiang and the toy industry cluster in the salt city of Jiangsu, which are characterized by endogenous innovation, close geographic location and affinity. After booming growth for over ten years, along with economic globalization and the informatization of science and technology, problems, such as poor processing quality, small scale production and limited innovation ability, spontaneously emerged in native-born clusters.

The initial stage is also when foreign capital flowed into China. In 1979, the State Council promulgated the Sino-Foreign Joint Venture Enterprise Law, which is the first regulation on FDIs, to establish four special economic zones-Shenzhen, Shantou, Zhuhai and Xiamen. For the next 10 years, capital flowed into the Chinese mainland on small scale, with \$25 billion of actual utilization and average annual inflows of \$2.09 billion. The capital came mainly from Hong Kong and Macao, major investors in a labor-intensive industry.

The national planning stage began in 1990 and runs through 2006. The reform of China's science and technology systems, which was published by the Central Committee of the CCP and the State Council (1985) and advanced in national key development areas, chose to adopt special preferential policies and gradually form emerging industrial development zones with particular superiorities and characteristics. By the end of 1988, the National Torch Plan was implemented. This plan focused on the construction and expansion of a hi-tech innovation park and on the conversion and maximization of scientific and technological achievements into real productive forces. This served as the prelude to the construction of high-tech zones throughout the country. Science and technology parks became extensions of the SCEZ (special economic zone) economy and windows for foreign affairs. Open markets, the introduction of capital and the transformation of traditional clusters characterized this stage. Science and technology parks, such as Zhongguancun Science Park in Beijing, Pudong New Area in Shanghai and Zhongshan Torch Development Zone in Guangdong, were built in succession with strong support in terms of funding, policies and projects provided by central and local governments.

In 1992, Comrade Deng Xiaoping, while on his southern patrol, announced to the world China's decision to open markets for the first time. Incoming capital in that year reached \$11 billion. The actual utilized value of foreign capital initially exceeded overseas borrowing. From 1990 to 2006, the average annual inward capital reached \$37.02 billion at a yearly growth of 36.20%. Industrial concentration, cheap labor and land preferential policies were main courses for attracting foreign investment. Within 15 years, the main economic indicator increased by more than 50% in 53 national hi-tech parks, making important contributions to the prosperity of the regional economy, with operating income increasing 393 times over, from ¥8.73 billion to ¥3.44 trillion, exports increasing 619 times over, from \$180 million to \$111.65 billion, and payable taxes and fees increasing 414 times over, reaching ¥161.58 billion.

During the innovation stage, which began in 2007, traditional industrial clusters transition

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towards innovation-driven clusters. Some hi-tech parks have the ability to innovate and establish perfect support systems for creation. By the end of 2012, 105 state-level hi-tech zones had accumulated 980 thousand scientific and technological personnel, over 90 thousand of whom had MDs and nearly 20 thousand had PhDs, while another ten thousand were from overseas. Of the 7 million employees, one-third have secondary degrees or above. There are batches of post-doctoral research stations, more than 400 hi-tech business service centers, and thousands of service support institutions in clusters, thereby shaping a complete and systematic R&D-incubation-industrialization of technological achievements. R&D expenses account for one-fifth of the overall costs for national R&D activities, and R&D expenses per capita are 6 times the nation-wide value. Authorized invention patents occupy 50 percent of the national patents.

Meanwhile, with respect to rising costs associated with the work-force and materials, foreign investors transfer to Cambodia, the Philippines, Vietnam and other southeast Asian economies with lower labor force costs, which then results in a slow or even negative growth in real use of foreign capitals in China. The shift in strategy from "investment promotion" to "investment selection" is imminent, though it gives rise to two key strategic problems. The first problem is whether an innovation element can be the cause or reason for foreign direct investment. The second concern involves the relationship between foreign ownership drive cluster innovation and business performance.

### 4. MODEL AND DATA SOURCES

To further study the impact of FDI efficiency spillover on cluster innovation and business performance, we use principle component analysis on samples of GEM companies listed before March of 2012. We then compare innovation factors within or beyond clusters and their contributions to business operations to identify key influencing factors that determine whether existing clusters are of the exogenous or endogenous type and that impact the FDI technique spillover on the micro-operation of enterprises.

#### 4.1. Theory of principle component analysis

Principle component analysis is a dimension reduction statistical analysis method that lessens original multiple indices to fewer main comprehensive indices, and it is generally employed to study complex system-embracing multi-factors. Too many variables increase the difficulty and complexity of the analysis. Utilizing correlations among original variables, we have fewer new variables than the original, and we extract the main comprehensive variables to measure, thus retaining more of the original information and simplifying the problem.

Assume we have original samples  $n$  and each sample has  $p$  variables, which constitute the matrix of  $n \times p$ :

$$X = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1p} \\ x_{21} & x_{22} & \cdots & x_{2p} \\ \vdots & \vdots & & \vdots \\ x_{n1} & x_{n2} & \cdots & x_{np} \end{bmatrix}$$

We record the original variable indicator as  $x_1, x_2, \dots, x_p$ , and measure new comprehensive variables after a dimension reduction for the  $z_1, z_2, z_3, \dots, z_m (m \leq p)$ . The coefficient  $l_{ij}$  is determined as follows:

$$\begin{cases} z_1 = l_{11}x_1 + l_{12}x_2 + \cdots + l_{1p}x_p \\ z_2 = l_{21}x_1 + l_{22}x_2 + \cdots + l_{2p}x_p \\ \cdots \cdots \cdots \\ z_m = l_{m1}x_1 + l_{m2}x_2 + \cdots + l_{mp}x_p \end{cases}$$

$Z_i$  and  $z_j$  ( $i \neq j$ ;  $i, j=1, 2, \dots, m$ ) are independent of each other. The variance of  $z_1$  is the maximum among the linear combination of  $x_1, x_2, \dots$  and  $x_p$ . The variance of  $z_2$  is the maximum among the linear combination of  $x_1, x_2, \dots, x_p$ , irrelevant of  $z_1$ . The variance of  $z_m$  is the maximum among the linear combination of  $x_1, x_2, \dots, x_p$ , irrelevant of  $z_1, z_2, \dots, z_{m-1}$ .

The new aggregative indicator  $z_1, z_2, \dots, z_m$  is termed separately as the 1<sup>st</sup>, 2<sup>nd</sup>, ..., m<sup>th</sup> main composition of the original index  $x_1, x_2, \dots, x_p$ .

To summarize, the essence of principle composition analysis is to obtain loads  $z_i$  ( $i=1, 2, \dots, m$ ), which proved in mathematics to be eigenvectors corresponding to the  $m$  eigenvalue of the correlation matrix of original variables  $x_j$  ( $j=1, 2, \dots, p$ ) for each principle component  $l_{ij}$  ( $i=1, 2, \dots, m$ ;  $j=1, 2, \dots, p$ ).

## 4.2. Calculation steps of principle composition analysis

### 4.2.1. Calculating correlation coefficient matrix

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1p} \\ r_{21} & r_{22} & \cdots & r_{2p} \\ \vdots & \vdots & & \vdots \\ r_{p1} & r_{p2} & \cdots & r_{pp} \end{bmatrix}$$

$r_{ij}$  ( $i, j=1, 2, \dots, p$ ) are the correlation coefficients of the original index  $x_i$  and  $x_j$  ( $r_{ij}=r_{ji}$ ), with the formula of computation as follows:

$$r_{ij} = \frac{\sum_{k=1}^n (x_{ki} - \bar{x}_i)(x_{kj} - \bar{x}_j)}{\sqrt{\sum_{k=1}^n (x_{ki} - \bar{x}_i)^2 \sum_{k=1}^n (x_{kj} - \bar{x}_j)^2}}$$

### 4.2.2. Calculating eigenvalues and eigenvectors

To solve the secular equation  $|R - \lambda I| = 0$ , we generally use the Jacobi method to find  $p$  latent root  $\lambda_g$ , therein  $g=1, 2, 3, \dots, p$ . Sorted by the size of the latent roots, we obtain

$\lambda_1 \geq \lambda_2 \geq \lambda_3 \cdots \geq \lambda_p \geq 0$ , demanding  $\sum_{j=1}^p e_{ij}^2 = 1$ , in which  $e_{ij}$  represents the  $j^{th}$  component of the eigenvector  $e_i$ .

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### 4.2.3. Calculating contribution rate and accumulative contribution rate of principle composition

The contribution rate is calculated according to the following formula:

$$\frac{\lambda_i}{\sum_{k=1}^p \lambda_k} \quad (i = 1, 2, \dots, p)$$

The accumulative contribution rate is calculated according to following formula:

$$\frac{\sum_{k=1}^i \lambda_k}{\sum_{k=1}^p \lambda_k} \quad (i = 1, 2, \dots, p)$$

Generally, we take eigenvalues above 80% of the accumulative contribution and where  $\lambda_1, \lambda_2, \dots, \lambda_m$  over 1 of the latent root correspond to the 1<sup>st</sup>, 2<sup>nd</sup>, ..., m<sup>th</sup> ( $m \leq p$ ) principle composition.

### 4.2.4. Calculating loads of principle composition

$$l_{ij} = p(z_i, x_j) = \sqrt{\lambda_i} e_{ij} \quad (i, j = 1, 2, \dots, p)$$

## 4.3. Systematic evaluations

After determining the number of principle compositions, we take the principle composition for systematic evaluation. First, we calculate the linear weighted value of each principle composition as per formula:

$$F_{ig} = \sum_{j=1}^p l_{gj} r_{ij} \quad (1)$$

$$i = 1, 2, 3, \dots, n$$

$$j, g = 1, 2, \dots, p$$

We then draw comprehensive value  $F_i$  by summing up the k principle composition weighted

by the contribution rate of each where  $d_g = \frac{\lambda_g}{\sum_{g=1}^p \lambda_g}$ . The basic formula is as given below:

$$F_i = \sum_{g=1}^k d_g \cdot F_{ig} \quad (2)$$

$$i = 1, 2, 3, \dots, n$$

$$g = 1, 2, \dots, k$$

Finally, we linearly regress using the least square method on k units of  $F_i$ , thus determining the devotion size and direction of innovation factors on business performance.

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## 4.4. Sample selection and data sources

Research indicates that an innovation-driving cluster is an important index as it reflects learning and creation ability. Therefore, we should reevaluate the role of FDIs on business performance from the profiles of this type of cluster. Regarding clusters as a vital location condition, does the FDI efficiency spillover directly impact business performance or indirectly impact innovation capacity through influence on? To answer this question, we use group studies based on samples of GEM listed companies prior to February 2012. Data are derived from the CSMAR database and annual financial reports released by enterprises. The GEM is the second-board stock market relative to the main market. It refers, in particular, to Shenzhen GEM, which is designed to support small- and medium-sized enterprises (SMEs), especially high-growth science and technology companies (ST firms) and to build legal exit mechanisms and financing platforms for venture capital firms (VC firms) and risk investments as incubators of high-growth ST firms. China established industrial parks, high-end new science and technology parks and economic development zones to attract industrial agglomerations, which we regard as innovation-driven clusters in subsequent studies, in favor of self-dependent innovations. Considering data completeness and financial stability, we classify companies with business address located in industrial parks, economic development zones, high-end and new science and technology parks into the cluster group and companies with business addresses located in other places beyond clusters into the non-cluster group. ST and PT companies are eliminated due to their abnormal financial situation. Companies with business address located in other type of clusters are also canceled. Thus, we have 188 high-tech listed companies, 102 in the cluster group and 66 in the non-cluster group.

We use performance ( $y$ ) to reflect ability of operation and commercialization, which considers creation and external and internal learning results. We measure creation performance by patent authorized numbers ( $x_1$ ), external learning ability by government subsidies ( $x_2$ ) and foreign equity ratio ( $x_3$ ), thus reflecting promotional ability by absorbing knowledge and skills spilled over through FDIs and government supports beyond enterprises. Internal learning ability is reflected by technical staff proportion ( $x_4$ ), R&D expenditure per capita ( $x_5$ ), education index ( $x_6$ ) and diversification of education ( $x_7$ ), which represent contributions of internal ST talents, devoted private capital, education degree and complementary talents to ascended ability. Variable definitions and economic implications are shown in Table 1.

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**Table 1: Systematic evaluation indicators of innovation abilities in high-tech enterprises**

Level-1 indicators	Level-2 indicators	Level-3 indicators	Definition of Level-3 indicators
Commercial ability	Performance level	Sales ( $y$ )	Sales of products or services.
		Sales per capita	Sales as percentage of number of employees.
Productive capability of innovation	Innovation performance	Number of authorized patents ( $x_1$ )	Number of authorized patents within the period, reflecting innovation performance.
External learning capabilities	Ability to acquire external know-how via official supports	Government grants ( $x_2$ )	Special funds supported by State Ministry of Science and Technology, Science and Technology Bureau and the local government; scientific research award fund for innovation team supported by Organizational Department of Municipal Committee.
	Ability to acquire external know-how via attracting foreign capitals	Ratio of foreign equity ( $x_3$ )	Proportion of foreign equity in company shares.
Internal learning abilities	Internal knowledge stock	Ratio of technical staff ( $x_4$ )	Technical staff as percentage of total employees.
	R & D intensity	R&D expenditure per capita ( $x_5$ )	R&D expenditure divided by number of employees.
	Employee level of education	Education index ( $x_6$ )	Undergraduate, graduate, master and doctoral education postponed for 2 years, 5 years, 8 years and 11 years, respectively, at a benchmark of 3 years of professional education. Education index calculated as per formula: percentage of staff with vocational education X3+ percentage of staff with bachelor degree X5+ percentage of staff with master degree X8+ percentage of staff with doctoral degree X11.
	Employee complementary knowledge	Educational diversification ( $x_7$ )	Ordinal variables. If 100% of the company's employees have bachelor's degree, 1 point; if 50% of employees have bachelor's degree, 50% have master's degree, 2 points; if 30% of employees have vocational degree, 40% have bachelor's degree, 20% have master's degree, and 10% have doctoral degree, 4 points.
Nature of Companies	Business experience	Age of companies	Business period since the establishment of companies.
	Size	Companies' assets	Companies' total assets.

## 5. MODEL TEST AND RESULTS ANALYSIS

### 5.1. Descriptive statistics

Comparing 11 indicators of samples, we find most are similar. The mean values of nine indicator in clusters are higher than those in non-clusters, for example, total assets (105053.45 to 104632.22), sales (42579.15 to 42506.93), sales per capita (5280.50 to 5270.40), government grants (725.11 to 723.27), ratio of foreign equity (3.76 to 3.68), ratio of technical staff (26.47/22.47), R&D expenditure per capita (3.44 to 3.37), education index (1.65



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to 1.64), educational diversification (2.18 to 2.17). These results suggest that cluster companies have certain advantages in performance as well as internal and external learning abilities. Additionally, talent is essential to high-tech oriented cluster enterprises, with 20 percent of technical staff in excess with respect to companies beyond clusters. While most cluster enterprises are new (10.78 to 10.80), the number of authorized patents is less than it is for entities in the non-cluster group (8.45 to 8.95).

The cluster group also has a greater standard deviation in government grants (78 to 22.74), sales per capita (73 to 18.26) and age of companies (8.37 to 6.35) than non-cluster group, thus indicating that cluster enterprises are eligible for government grants diversely and with great disparities in creation times and sales performances. Cluster enterprises also demonstrate the largest gap in technical staff proportion (31.75 to 25.90) compared to non-cluster enterprises (see Table 2).

**Table 2: Variable descriptive statistics**

Indicators	Mean Value			Standard Deviation		
	Total sample (N=188)	Non-cluster group sample (N=66)	Cluster group sample (N=102)	Total sample (N=188)	Non-cluster group sample (N=66)	Cluster group sample (N=102)
Companies' Total Assets (Ten thousand yuan)	104,733.18	104,632.22	105,053.45	673.21	642.01	614.04
Sales (ten thousand yuan)	42,562.79	42,506.93	42,579.15	417.01	445.24	497.15
Sales per capita (ten thousand yuan per person)	5,277.04	5,270.40	5,280.50	82.32	18.26	73.00
Number of authorized patents ( $x_1$ )	8.68	8.95	8.45	9.85	12.00	13.00
Government grants (ten thousand yuan) ( $x_2$ )	722.13	723.27	725.11	77.24	22.74	78.00
Ratio of foreign equity ( $x_3$ )	3.74	3.68	3.76	10.71	10.44	10.50
Ratio of technical staff ( $x_4$ )	24.11	22.47	26.47	24.32	31.75	25.90
R&D expenditure per capita (ten thousand yuan per person) ( $x_5$ )	3.39	3.37	3.44	3.46	3.48	3.90
Education index ( $x_6$ )	1.63	1.64	1.65	0.74	0.77	0.74
Educational diversification ( $x_7$ )	2.18	2.17	2.18	0.44	0.43	0.44
Age of companies	10.79	10.80	10.78	8.35	6.35	8.37

### 5.2. Factor analysis and Eigenroot test

The variable correlation matrix shows, for cluster companies, that R&D expenditures per capita ( $x_5$ ) are obvious and positive, while the technical staff proportion ( $x_4$ ) and education index ( $x_6$ ) are markedly and negatively correlated with government grants ( $x_2$ ), thus suggesting an incentive function from government support for the creation of necessary R&D inputs. Official funds are only used for compensating capital shortages for creation, rather than for the introduction and cultivation of senior talent, which is contrary to the improvement of overall quality. The number of authorized patents ( $x_1$ ) is significantly and positively related to government grants ( $x_2$ ) and education index ( $x_6$ ), indicating that staff quality and government support may stimulate creative activities (see Table 3).

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**Table 3: Correlation matrix between variables in the cluster group**

	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$	$x_6$
$x_1$	1.000					
$x_2$	0.299***	1.000				
$x_3$	0.071	-0.018	1.000			
$x_4$	-0.044	-0.155*	-0.069	1.000		
$x_5$	0.106	0.561***	-0.002	-0.041	1.000	
$x_6$	0.179**	-0.141*	-0.023	0.044	-0.109	1.000

**Note:** \*\*\* represents significance at the 1% level using a one-tailed test; \*\* represents significance at the 5% level using a one-tailed test; \* represents significance at the 10% level using a one-tailed test.

For companies beyond clusters, education index ( $x_6$ ) and the ratio of technical staff ( $x_4$ ) are obviously and positively correlated with government grants ( $x_2$ ), implying that official funds are mainly used for training and talent introduction to improve overall quality. Education index ( $x_6$ ) is significantly and positively correlated with the ratio of foreign equity ( $x_3$ ) and ratio of technical staff ( $x_4$ ), thus showing that inward foreign capital contributes to flow and the introduction of talented personnel to enhance the overall quality of employees. The number of licensed patents ( $x_1$ ) and the ratio of technical staff ( $x_4$ ) is obviously and positively correlated, thus suggesting that skilled labor force promotes innovation (see Table 4).

**Table 4: Correlation matrix between variables in non-cluster group**

	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$	$x_6$
$x_1$	1.000					
$x_2$	0.023	1.000				
$x_3$	-0.041	0.012	1.000			
$x_4$	0.197*	0.254**	-0.040	1.000		
$x_5$	0.029	0.104	-0.089	-0.019	1.000	
$x_6$	-0.002	0.275**	0.168*	0.355**	-0.074	1.000

**Note:** \*\*\*\*\* represents significance at the 1% level using a one-tailed test; \*\*\*\*\* represents significance at the 5% level using a one-tailed test; \*\*\*\*\* represents significance at the 10% level using a one-tailed test.

Information drawn from relevant data may overlap for possible correlation between indices. We use SPSS17.0 software for principal component analysis to reduce data dimensions using the projection method and discompose information into discrete parts in the lower dimension to obtain a more meaningful interpretation. The eigenvalue of the three principal components and their variance contributions are shown in Table 5.

**Table 5: Total variance decomposition**

Sample	Component	Total	Variance contribution rate (%)	Cumulative variance contribution rate (%)
in cluster group	1	2.731	38.847	38.847
	2	1.681	24.691	63.538
	3	1.562	21.705	86.243
in non-cluster group	1	2.627	37.112	37.112
	2	1.685	24.757	61.870
	3	1.530	21.171	84.040

**Note:** column "Total" corresponds to Eigenroot of each component

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We extract the first three principle components in the cluster and non-cluster groups with eigenroots greater than 1 and list variance contributions from top to bottom, thus explaining 86.243% and 84.04% of the variance of original variables, respectively, and reflecting most of the information available for basic indicators. Therefore, we use these three principle components to replace variables corresponding to the original six tertiary indicators.

For samples of clustered and non-clustered groups, KMO (Kaiser-Meyer-Olkin metrics) statistics are 0.492 and 0.513, respectively, and the Bartlett sphericity test reveal 0.000 and 0.034 for P values below 0.05 level of significance. Thus, we reject the null hypothesis that groups of data are suitable for factor analysis (see Table 6).

**Table 6: Results of KMD and Spherical Bartlett test**

Sample	KMO test	spherical Bartlett test	df	Sig.
in cluster group	0.492	56.869	15	0.000
In non-clustered group	0.513	19.564	10	0.034

There is no significant difference on partial loads of original variables. To conveniently name determinants, we rotate factor loadings. Table 7 indicates that the coefficients are divided after rotation. For the cluster group, the first principal components have greater loads on R&D expenditure per capita ( $x_5$ ) and government grants ( $x_2$ ), indicating these two variables are subject to innovation input indicators and are highly correlated. Thus, they are grouped into the "input factor" category. The second principal component has larger loads on the education index ( $x_6$ ) and authorized patent number ( $x_1$ ) variables and thus belong to the innovation indicator as these two variables are highly correlated. Thus they are placed in the "innovation factor" category. The third principal component is highly correlated with the ratio of foreign equity ( $x_3$ ) and the ratio of technical staff ( $x_4$ ) which reflect learning ability. Thus, these two factors are placed in the "learning factor" category.

**Table 7: Factor loading matrix of two sample groups**

Matrix and sample groups	component matrix						rotated component matrix <sup>a</sup>					
	cluster group			non-cluster group			cluster group			non-cluster group		
components	1	2	3	1	2	3	1	2	3	1	2	3
$x_1$	0.450	0.699	0.007	0.246	0.464	-0.656	0.351	0.737	0.156	0.029	-0.023	0.840
$x_2$	0.886	-0.029	0.097	0.634	0.139	0.423	0.885	0.075	0.089	0.717	0.302	-0.081
$x_3$	0.051	0.167	-0.776	0.151	-0.693	0.057	-0.124	0.075	0.782	0.217	-0.543	-0.405
$x_4$	-0.276	0.025	0.615	0.753	0.185	-0.226	-0.150	0.071	-0.654	0.651	-0.045	0.476
$x_5$	0.790	-0.169	0.197	-0.015	0.585	0.600	0.828	-0.061	-0.042	0.092	0.823	-0.131
$x_6$	-0.197	0.797	0.181	0.750	-0.306	0.081	-0.257	0.789	-0.14	0.768	-0.266	-0.047

**Note:** (1) Extraction method: principal component analysis. (2) Rotation method: Kaiser standardized orthogonal rotation method. (3) A: converge after an iteration procedure.

For the non-cluster group, the first principal component has greater loads on education index ( $x_6$ ), government grants ( $x_2$ ) and ratio of technical staff ( $x_4$ ) subject to learning ability index, indicating that these three variables are highly correlated and can be grouped into the "learning factor" category. The second principal component has larger loads on R&D expenditures per capita ( $x_5$ ) and foreign ownership ( $x_3$ ), which belongs to business input indicators, indicating that these two variables are highly correlated and are grouped into the "input factor" category. Similarly, the third principal component has a larger load on the

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number of authorized patents ( $x_1$ ) subject to the innovation ability index and grouped into the "innovation factor" category.

Visual innovation capability of high-tech companies can be determined from the profiles of the inputs and the innovation and learning factors. The two sample groups vary in their maximum factor loadings. For the cluster enterprises, innovation inputs mainly depend on state support and enterprise-owned R&D expenditures, and staff's all-around quality determine innovation achievement mainly by attracting top talents and FDI technology spillovers to acquire knowledge. For enterprises beyond clusters, innovation inputs originate from self-owned R&D expenditures and inward foreign capitals. With respect to the introduction of top talents, state grants upgrade the overall quality of the staff through improved learning abilities (see Table 8).

**Table 8: Principal component description of two sample groups**

Main ingredients	Highly relevant variables in cluster group		Highly relevant variables in non-cluster group		Implied meaning
Input factor	$x_5$ $x_2$	R&D expenditure per capita Government grants	$x_5$ $x_3$	R & D expenditures per capita Ratio of foreign equity	Reflect sources of innovation funds and degree of attention on creation.
Innovation factor	$x_6$ $x_1$	Education index Number of authorized patents	$x_1$	Number of authorized patents	Reflect innovation capability and achievements.
Learning factor	$x_4$ $x_3$	Ratio of technical staff Ratio of foreign equity	$x_2$ $x_6$ $x_4$	Government grants Education index Ratio of technical staff	Reflect learning ability and channel

### 5.3. Equation and score of principle component

Table 9 presents the factor score matrix - un-rotating factor solution - from which we draw expressions of the main components for the cluster group. These include:

$$\begin{aligned}
 F_1 &= 0.34x_1 + 0.67x_2 + 0.04x_3 - 0.21x_4 + 0.6x_5 - 0.15x_6 \\
 F_2 &= 0.64x_1 + 0.03x_2 + 0.15x_3 + 0.02x_4 - 0.16x_5 + 0.73x_6 \\
 F_3 &= 0.01x_1 + 0.09x_2 - 0.75x_3 + 0.60x_4 + 0.19x_5 + 0.18x_6
 \end{aligned} \tag{3}$$

Similarly, each primary component for the non-cluster group is expressed as:

$$\begin{aligned}
 F_1 &= 0.12x_1 + 0.59x_2 + 0.19x_3 - 0.01x_4 + 0.59x_5 + 0.5x_6 \\
 F_2 &= -0.64x_1 + 0.17x_2 + 0.43x_3 + 0.54x_4 - 0.28x_5 + 0.13x_6 \\
 F_3 &= 0.06x_1 - 0.22x_2 - 0.65x_3 + 0.59x_4 + 0.08x_5 + 0.42x_6
 \end{aligned} \tag{4}$$

**Table 9: Principal component score coefficient matrix of two sample groups**

Variable	Eigenvectors of cluster group			Eigenvectors of non-cluster group		
	$F_1$	$F_2$	$F_3$	$F_1$	$F_2$	$F_3$
$x_1$	0.34	0.64	0.01	0.12	-0.64	0.06
$x_2$	0.67	0.03	0.09	0.59	0.17	-0.22
$x_3$	0.04	0.15	-0.75	0.19	0.43	-0.65
$x_4$	-0.21	0.02	0.60	-0.01	0.54	0.59
$x_5$	0.60	-0.16	0.19	0.59	-0.28	0.08
$x_6$	-0.15	0.73	0.18	0.50	0.13	0.42

Taking a relative value or numerical value of variables, we calculate the variance contribution rate of the common factor weighted by the evaluation statistic:

$$F = \frac{\lambda_1}{\lambda_1 + \lambda_2 + \lambda_3} F_1 + \frac{\lambda_2}{\lambda_1 + \lambda_2 + \lambda_3} F_2 + \frac{\lambda_3}{\lambda_1 + \lambda_2 + \lambda_3} F_3 \dots \dots \dots (5)$$

Computing weights of each principal component of the cluster group samples, we have:

$$\begin{aligned} \frac{\lambda_1}{\lambda_1 + \lambda_2 + \lambda_3} &= \frac{2.731}{2.731 + 1.681 + 1.562} = 0.4571 \\ \frac{\lambda_2}{\lambda_1 + \lambda_2 + \lambda_3} &= \frac{1.681}{2.731 + 1.681 + 1.562} = 0.2814 \\ \frac{\lambda_3}{\lambda_1 + \lambda_2 + \lambda_3} &= \frac{1.562}{2.731 + 1.681 + 1.562} = 0.2615 \end{aligned}$$

Similarly, the weights of each principal component of the non-cluster group samples are calculated as below:

$$\begin{aligned} \frac{\lambda_1}{\lambda_1 + \lambda_2 + \lambda_3} &= \frac{2.627}{2.627 + 1.685 + 1.530} = 0.4497 \\ \frac{\lambda_2}{\lambda_1 + \lambda_2 + \lambda_3} &= \frac{1.685}{2.627 + 1.685 + 1.530} = 0.2884 \\ \frac{\lambda_3}{\lambda_1 + \lambda_2 + \lambda_3} &= \frac{1.530}{2.627 + 1.685 + 1.530} = 0.2619 \end{aligned}$$

According to formulas 1 and 2, we obtain a comprehensive score that evaluates innovation abilities of listed high-tech enterprises in the two groups. The results are shown in Table 10.

**Table 10: Scores and ranks of principal components of each sample group**

sub-sample	input factor	rank	innovation factor	rank	learning factor	rank	comprehensive	rank
cluster Group	7.50	1	1.44	2	5.58	1	6.74	1
non-cluster group	6.45	2	3.40	1	3.40	2	4.46	2

Ranking by principal component scores, we find that samples in the cluster group received larger scores for input and learning factor compared to samples in the non-cluster group, indicating that cluster enterprises prevail in capital attraction, emulation and evaluation. Comparing component weights of the two groups, we conclude that cluster enterprises focus more attention on capital and other input elements to enhance their learning ability. Companies in the cluster group received lower scores for innovative factor, thus explaining their weaker innovation capacity. Cluster strengths in resource agglomeration and learning networks have not yet been converted into innovation advantages.

#### 5.4. Regression analysis on principle component

To further compare spillover effects of foreign equity by companies within and beyond clusters, we extracted three principal components  $F_1$ ,  $F_2$ ,  $F_3$  as independent variables and sales ( $y$ ) as the dependent variable for multiple linear regression analysis. From regressive results for the cluster group and the non-cluster group (see Table 11), original decision coefficients were 0.947 and 0.984, and adjusted coefficients of determination were 0.918 and 0.952, respectively, indicating a good fitness of the model. For the two models, the Durbin-Watson values are 2.124 and 1.825, respectively.  $d_l = 0.96$ ,  $d_u = 1.63$ ,  $d_u < DW < 4 - d_u$  indicate that no autocorrelation exists for the two models at the 5% significance level.

**Table 11: Regressive results on principal component**

	Cluster Group (n=102)		Non-cluster group (n=86)	
	Coefficient	Standard error	Coefficient	Standard error
Constant	10.33*** (87.277)	0.028	10.472*** (101.44)	0.074
F <sub>1</sub>	1.25*** (15.038)	0.001	-0.45*** (-6.06)	0.075
F <sub>2</sub>	-0.91** (-8.182)	0.011	0.085*** (0.1)	0.075
F <sub>3</sub>	-1.10** (-10.772)	0.014	1.74** (2.32)	0.075
R <sup>2</sup>	0.947		0.984	
AdjustedR <sup>2</sup>	0.918		0.952	
Durbin-Watson	2.124		1.825	
Residual sum of squares	0.132		0.086	
F statistic	159.219***		11.858***	

**Notes:** Data in parentheses are t statistics; \*\*\* represents significance at the 1% level; \*\* represents significance at the 5% level; \* represents significance at the 10% level.

Histograms of the residuals indicate that the residuals distribute normally. As there are no abnormal values, the model is effective and achieves highly reliable estimated results. The standard P-P diagram of standardized residuals shows that data points exist regularly around the baseline. Non-parametric tests on standardized residuals show that standardized residuals satisfy normal distribution. Residual errors are eligible for linear regression.

Restoring standardized data  $x_1^*, \dots, x_5^*$ , we obtain the equation regressed on the original data  $x_1, \dots, x_6$  and embraced by the principal component in the cluster group:

$$\hat{y} = 10.33 - 0.167x_1 + 0.80x_2 - 0.06x_3 - 0.852x_4 + 0.691x_5 - 0.78x_6$$

Similarly, we obtain the equation regressed on the original data  $x_1^*, \dots, x_5^*$  and embraced by the principal component in the non-cluster group.

$$\hat{y} = 10.472 - 0.004x_1 - 0.635x_2 - 1.18x_3 + 1.078x_4 - 0.276x_5 + 0.417x_6$$

Multiple regressive results (see Tables 11 and 12) show that for the cluster group, all factors except state grants ( $x_2$ ), foreign equity ratio ( $x_3$ ) and R&D expenditures ( $x_5$ ) restrain sales. Judging by the magnitude of the coefficients, state grants ( $x_2$ ), R&D expenditures per capita ( $x_5$ ), foreign equity ratio ( $x_3$ ), number of authorized patents ( $x_1$ ), education index ( $x_6$ ) and ratio of technical staff ( $x_4$ ) contribute to sales degressively. This is consistent with previous research, and it indicates that existing clusters in China remain driven by the government. Regarding cluster enterprises, the growth of sales rely heavily on support from government funds and independent research and development. For the non-cluster group, factors in addition to education index ( $x_6$ ) and ratio of technical staff ( $x_4$ ) hinder sales. According to coefficient magnitudes, the ratio of technical staff ( $x_4$ ), education index ( $x_6$ ), number of authorized patents ( $x_1$ ), R&D expenditures ( $x_5$ ), state grants ( $x_2$ ) and foreign equity ratio ( $x_3$ ) contribute degressively to sales. Thus, we determine that human capital more effectively enhances the performance of companies beyond clusters.

**Table 12: Comparison of variable coefficients in the two sample groups**

Samples in	$x_1$	$x_2$	$x_3$	$x_4$	$x_5$	$x_6$
cluster group	-0.167	0.800	-0.060	-0.852	0.691	-0.780
non-cluster group	-0.004	-0.635	-1.180	1.078	-0.276	0.417

## 5.5. Analysis of empirical research

Selecting 188 GEM companies listed before 2012 in China, we divide these companies into cluster and non-cluster groups per business area. We employ principal component regression analysis to compare innovation, learning and factor input abilities of the two samples as well as their impact on business performance. After data screening, we have 106 companies in the cluster group and 82 companies in the non-cluster group, indicating small-and medium-sized technology listed companies mostly operate within clusters to make full use of preferential policies and the agglomeration effects of innovation resources. The two sets of samples extracted three main components that embrace the different variables.

The "input factor" reflects the value the company places on R&D investments and on where the R&D capital comes from. Cluster enterprises funding their R&D activities with government grants ( $x_2$ ) and their own paper ( $x_5$ ) should comply with the compulsory provision of the cluster management committee whereby membership should devote a certain percentage of the profits to R&D activities, for example, 10 percent. This suggests that innovation is the purpose of the cluster establishment where government supports and corporate R&D investments are equally important. Companies beyond clusters obtain innovation capital primarily from self-owned R&D investments ( $x_5$ ) and foreign funds ( $x_3$ ). Variable differences explain that enterprises within clusters can more easily access government policy support. Receiving less support from government, companies beyond clusters focus more attention on foreign innovation drive. Spending on R&D ( $x_5$ ) highly correlates with the "input factor" in the two sample groups, indicating the GEM listed companies generally attach great importance to R&D activities, irrespective of their geographic location.

The "innovation factor" reflects a company's innovation performance and its sources. For enterprises within clusters, education index ( $x_6$ ) and the number of authorized patents ( $x_1$ ) are determinants, and accordingly, they represent the importance of improving staff quality to enhance the learning effects and stimulate creation. For the two sample groups, the number of authorized patents ( $x_1$ ) is highly correlate with innovation indicators, thus indicating that patents directly reflect corporate innovative performance.

The "learning factor" reflects corporate capacity through internal and external learning to acquire know-how spillovers or transfers. For companies within clusters, the ratio of foreign equity ( $x_3$ ) and the ratio of technical staff ( $x_4$ ) are key factors influencing a company's learning ability. For companies beyond clusters, government grants ( $x_2$ ), education index ( $x_6$ ) and ratio of technical staff ( $x_4$ ) are main influencing factors, indicating clusters are more capable of absorbing external know-how, techniques and managerial skills spilled from foreign invested entities. Cluster enterprises are more concerned with internal learning and the enhancement of general quality by attracting advanced talents and skills training, both of which are conducive to creation. For the two sample groups, the ratio of technical staff is highly associated with the learning indicator, indicating the technical personnel are prerequisite for innovation.

Regression results for the cluster and non-cluster groups show that the coefficients of

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government grants ( $x_2$ ) are 0.8 and -0.635 and the coefficients of R&D expenditures ( $x_5$ ) are 0.691 and -0.276, respectively. These results indicate that for enterprises within clusters, state grants and R&D expenditures add one percent, while sales revenues add 0.8 percent and 0.691 percent, respectively. For enterprises beyond clusters, state grants and R&D expenditure add one percent, sales revenues decrease the coefficients by 0.635 percent and 0.276 percent, respectively. This suggests that certain elemental conditions must be satisfied to realize the full effect driven by government support and R&D spending. The collection of innovation elements in clusters is conducive to the positive role of government support and R&D inputs. With respect to the lacking factorial conditions beyond clusters, state grants and R&D investments are conducive to innovation, while lagged or rough processing of industrialization eventually hinders sales growth. For two sample groups, regressive coefficients of the variable education index ( $x_6$ ) are -0.780 and 0.417 and for technical staff ratio ( $x_4$ ), the coefficients are -0.852 and 1.078. For companies beyond clusters, staff quality and technical staff ratio improve one percent, sales revenue increases by 0.417 percent and 1.078 percent, respectively, thus suggesting that staff quality and science and technology talents significantly boost performance of businesses beyond clusters. Thus, it is concluded that, technical personnel plays a more important role than staff quality. While these two variables within the cluster group are negatively correlated with corporate performance, this is probably because of the existing lagged process of converting creative achievement into sales, even though the comprehensive quality of employees and technical staff drive innovation. This explains the discriminatory short-term business objective such that high-tech enterprises within clusters give priority to innovation, while companies beyond clusters focus on sales. For the two sample groups, the number of authorized patents ( $x_1$ ) and ratio of foreign equity ( $x_3$ ) are notably and negatively associated with sales. For each one additional percentage in the number of patents ( $x_1$ ), sales revenues decrease by 0.167 percent and 0.004 percent for enterprises within and beyond cluster, respectively. Therefore, innovation performance in cluster enterprises has the greatest effect on sales. Because innovation performance has negative impacts on sales, external funding support from governments or from overseas is crucial. Cluster members are the most incubated entities as they lack marketing channels and market foundations. This, combined with the hysteretic process of turning creative achievements into industrial products, causes creative activities to prominently crowd out sales. For each one additional percentage of foreign equity ratio ( $x_3$ ), sales revenues in enterprises within and beyond clusters are reduced by 0.06 percent and 1.18 percent, respectively. Because of comprehensive innovative elements and strong absorption capacity, enterprises within clusters can quickly absorb FDI technology spillovers and rapidly respond to the market. Additionally, cluster enterprises are less impacted by crowd-out effects caused by the entrance of foreign investors.

## 6. CONCLUSION AND POLITICAL RECOMMENDATION

Based on principal component analysis, this paper constructs three main ingredients of inputs, innovation and learning factors, and then uses multiple regression to compare disparities in the element and their impacts on performance for enterprises inside and outside clusters. The results show the following:

(1) Governments give priorities to existing clusters whose performances are weakly associated with market segmentation, extended value chains, specialization and industrial links. Cluster innovation highly depends on governmental financial support and their own capital investments, thus absorbing less technology spillover from foreign equity. This suggests that in cluster enterprises, endogenous creation dominates and operating performance receives less attention. With respect to the existing stock shortage of capital and



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technology, Chinese governors should pay more attention to exogenous sources of innovation, encourage foreign equity and venture capital investment, strengthen international cooperation in research and development, and support science and technology development projects of foreign enterprises or R&D institutions.

(2) Talents are the most valuable treasure for high-tech entities. Governments should guide enterprises to improve staff quality by conducting joint trainings or technical exchanges, holding regular staff skills competitions, visiting leading companies and engaging in learning activities with universities and scientific research institutions.

(3) There is a weak connection between cluster innovation and sales performance. Governments should focus on building technical service networks and platforms to industrialize innovative achievements by attracting intermediary service organizations into parks and establishing commercial organizations and clubs to accelerate the process of industrializing creative achievement.

Many other indicators influence innovation performance, some of which are difficult to quantify or are the result of subjectivity. This research adheres to quantifiable and available principles in index selection, but inevitably, it possibly neglects some influencing factors and could thereby report biased results. Most of the GEM listed companies are young, and their financial reports inevitably contain missing data, which affects sample size as well as subsequent analysis. In addition, it is difficult to judge the rationale of the statistical caliber when it is not revealed by enterprises established in various time and location.

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# DOES LOW CARBON TECHNOLOGY CONTRIBUTE TOWARDS LOW CARBON ECONOMY? A REVIEW\*

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**Abstract:** Over the years, greenhouse gas emissions in developing countries have been increasing in tandem with economic growth and energy consumption. A significant share of these emissions can be avoided through effective usage of low carbon technologies, while providing the same or higher level of energy services. In this regard, greater use of technological options includes promoting energy efficient and renewable energy options, reducing energy consumption in the energy conversions, enhancing less energy intensive economic activities, switching from coal based electricity generation to other renewable options, which could play an important role to reduce emissions. Thus, this article attempts to conduct a review of literature of using low carbon technologies in terms of environmental and economic benefits (emission reductions or cost savings) towards achieving low carbon economy.

**Keywords:** Low Carbon Technology, Low Carbon Economy

## 1. INTRODUCTION

The development of low carbon economy (LCE) depends on many factors such as economy, society, politics, law and culture, which decide the complexity of its development pattern selection (Dou *et al.* 2013; Hu *et al.* 2011). Grossman and Krueger (1995) revealed that if depleting and renewable natural resources serve as inputs into the production of major goods and services, the composition of output and the means of production if were unassailable, then harm to the environment due to economic activities would be inescapable. Though such problem can be reduced through a structural reformation mainly in terms of the energy use and environmental regulation, yet the question of whether the goal of higher

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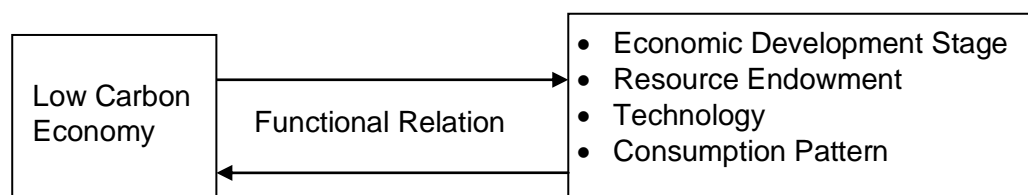
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economic growth and better environmental preservation is a mutually exclusive choice. However, developing countries are facing bigger challenges in terms of taking or implementing policy and programs such a way which would avoid or manage the environmental problems while continues to foster its economic growth and development. Despite such dilemma, adoption of low carbon technology (LCT) is crucial for public and private sector to grab the opportunity to generate new markets and businesses. Over the years, greenhouse gas emissions in developing countries have been increasing in tandem with economic growth and energy consumption. A significant share of these emissions can be avoided through effective usage of low carbon technologies, while providing the same or higher level of energy services. In this regard, greater use of technological options includes promoting energy efficient and renewable energy (RE) options, reducing energy consumption in the energy conversions, enhancing less energy intensive economic activities, switching from coal based electricity generation to other renewable options, which could play an important role to reduce emissions. The important question is that are these low carbon technologies economically viable to use while reducing a significant proportion of emissions. Thus, this article attempts to conduct a review of literature of using low carbon technologies in terms of environmental and economic benefits (emission reductions or cost savings) towards achieving a low carbon economy.

### 2. CONCEPT OF LOW CARBON TECHNOLOGY TOWARDS LOW CARBON ECONOMY

The terminology of low carbon economy was not coined before the 1990s and it didn't prevail until the February 24th, 2003, when the former British Prime Minister Tony Blair declared to ensure low carbon economy through reducing 60% carbon emission by 2050 (UK Department of Trade and Industry, 2003). Consequently, this issue spread out through the Intergovernmental Panel for Climate Change (IPCC) where the panel emphasized on global collaborative action (Jiahua *et al.* 2010). Low carbon economy consists with "three low", low energy consumption, low pollution, low emission and "one high" high-performance (UK Department of Trade and Industry, 2003). In addition, low carbon economy is conceptualized based on novelty in economic development in terms of agricultural and industrial civilization intending to pursue energy efficiency (EE) through optimizing energy base, low emission and low pollution. In other words, the concept of low carbon economy is used to make an innovation high-level economic development paradigm by forming a clean energy structure (Chuanjiang *et al.* 2011). However, Zongcai (2010) revealed that low carbon economy is consisted with three main aspects of low carbon production, carbon flow and carbon consumption for the sake of development paradigm has greater obligation rather than green economy and cyclic economy, the fundamental means of resolving the tradeoff between economic development and energy crisis, and to attain an equilibrium among economic and social development and ecological environment. However, the means of achieving the goal has been a disputed issue across the countries but a common thought is that technology innovation is crucial to low carbon economy (Grossman and Krueger, 1995; Jiahua *et al.* 2010) where renewable energy would be the most sustainable solution to meet the future and present energy demand. Jiahua *et al.* (2010) describes a conceptual framework of LCE which should consist of the four elements: development stage (economic), low carbon technology, consumer behavior, and resource endowment as shown in Figure 1. The de-carbonization of production, energy structure, and consumption patterns are all closely correlated to development stage.



**Figure 1. Functional relation between LCE and other elements**

Source: Jiahua *et al.* (2010)

In the above function, economic development stage mainly reflected by industrial structure, per capita income, urbanization rate, etc. Nevertheless, there is an empirical link between industrialization and carbon emission either positively or negatively. Resource endowment covers a wide range of resources, such as mine resource, renewable energy, land resource, labor resource, funding and technology resource etc., all being crucial input for low carbon economy development. Apparently, resource in this context does not only consist of natural resource but also human resource, without which nuclear or renewable energy could not be well-utilized. Resource endowment lays material foundation for low carbon economy.

Technology especially refers to technologies concerning carbon efficiency in producing energy intensive products. Normally, technology level is related with development stage but it is not always the case. Developing countries could use advanced low carbon technologies to surpass the traditional “from low income-low emission to high income-high emission” development pattern and leap forward towards higher income-low emission stage. Usually, LCT is a technology that over its lifecycle causes very low to zero CO<sub>2</sub> equivalent emissions. The low carbon technology refers promoting de-carbonization through ensuring energy efficiency, capturing and storing of carbon, improving management, and optimizing the energy structure (Jiahua *et al.* 2010). Innovation of the low carbon technology is imperative, especially in the energy intensive sectors such electricity, fossil chemical, building construction, transportation, etc. This is also important that the innovation of such technology will be commercialized and be applied in future. Indeed, innovation of low carbon technology becomes a vital element for a transition towards LCE.

Consumption pattern reflects the energy or carbon demand or from different consumption habits and living standards. All economic activities are aimed at current or future consumption, so eventually all energy consumption is driven by various consumption demands. Differences in development level, national conditions, lifestyles, residents in different countries have very different energy consumption and carbon emission patterns. Shui and Dowlatabadi (2005) revealed that the household consumption, emission accounts for 80% of total emission in the USA since 1990s. Therefore, the innovation of low or zero carbon technology for household is imperative towards the low carbon economy.

Moreover, Mulugetta and Urban (2010) divided the low carbon economic development into the following four categories according to the difference in the growth pattern (high growth or low growth) and the production or consumption related policies, measures and strategies (consumer side or production side):

- Low carbon growth (high growth and production side);
- Low carbon lifestyle (high growth and consumer side);
- Harmony growth with nature (consumer side and low growth); and
- Balanced economy (low growth and production side).

These categories are very different in the direction, goals, priorities and means of development. As the development concepts and strategies in different countries have some

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differences, it leads to the different patterns of low carbon-economy development practiced by different countries. No matter what pattern is practiced, the goal is to promote comprehensive low-carbonization development of the socio-economy oriented to sustainable development (Dou, 2013). To deliver the low carbon economy, business, industry and the country as whole would require new and innovative technologies to help to meet the climate change challenge, whilst maintaining and enhancing the quality of the environment.

### 3. ISSUES AND CHALLENGES TO THE ADOPTION OF LCT TOWARDS LCE

Although in the years there was a debate between economist and policy makers about the strategies to control the pollution. While economist view was in the favor of the market approaches (e.g. taxes or tradable permit) rather than uniform emission standard or uniform technology mandate (command and control). However, both policies are criticized on the ground of efficiency and effectiveness. For instance, Lohmann (2006) raised the issue of the effectiveness of trading pollution allowances, while to address the global warming phenomena requires more radical changes rather than the modest changes which is driven by pollution trading schemes. Lohmann (2006) also argued that global warming necessitates “nothing less than a reorganization of society and technology that will leave most remaining fossil fuels safely underground”. Indeed, if the carbon trading is cheaper than structural change in technology, consequently, in the long run LCT may not prevail. However, an empirical study by Carlson *et al.* (2000) found that due to technological advancement the marginal cost of sulphur dioxide removal reduced 20% (\$50) after launching the market allowances. This implies that market allowances worked as a market force for developing LCT over the time. However, market approach alone could not ensure a structural change of LCT from the conventional technologies. Apart from the market approach, protecting infringement of property rights is very conducive in promoting LCT or investment in R&D would not take place. Popp (2001) found a strong positive association between patent and innovative energy saving technology in which a single patent yields a present value of approximately \$6 million in cost savings across the industry. Therefore, the patent system establishes ownership rights to innovation and other technical improvements.

Indeed the progress of low carbon or energy efficient technologies is taking place, but it follows a heterogeneous nature across the countries. For instance, the developed countries who have a large volume of export are innovating more energy efficient technology than less exports oriented and less developed countries. Urpelainen (2011) revealed that inexpensive electricity supplies in the local economy hinders the development of energy efficient technology, hence they fail to compete the international market in terms of LCT. Those countries having lower level of nuclear and hydroelectric generation along with high export orientation have an incentive to invent energy efficient technology (Urpelainen, 2011). The thought of Hicks (1932) who prescribed to increase the factor prices which would lead to innovation economize on usage of the more expensive factor. From that point of view, technological advancement is considered as an endogenous factor rather than exogenous. Though, a few existing models of climate change comprise technological change as endogenous factor and that has an impact on carbon emissions (Goulder and Schneider, 1999; Nordhaus, 2002; Buonanno *et al.* 2003) though there is scarce of empirical evidences. Popp (2001) pointed out that the cost of any climate change strategy would be reduced due to induced innovation, but the overall effect on the environment is negligible. However, he is optimistic about restrictive climate change policies, which can ensure a significant reduction in future emissions. Since climate change has been a global concern, therefore any initiatives by an individual or a few countries may not be sufficient to reach the goal which indicates urgency for global cooperation. Although Sorrell (2009) urged that usage of energy may not be diminished due to energy efficiency innovations unless they are suited by regulations. At the same time, the economic transition towards developing and adopting low carbon technology requires huge investment, consequently it might have a very adverse

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effect on economic growth even this prevalence of this adverse effect might be higher in any economy (Chi *et al.* 2012).

Generally, LCT has been developed by the industrial or developed countries, but it is crucially required for highly emerging or developing economy to mitigate the carbon emission (Dechezlepretre *et al.* 2011). Therefore, the diffusion of this technology across the world becomes a challenge as long as the developing countries are reluctant to shoulder all the cost associated with adopting this technology. At the same time, the developed countries are reluctant to transfer the intellectual property. Ockwell *et al.* (2010) suggest that intellectual property protection is a necessary but insufficient condition for the success of low carbon technology transfer. A study carried out by UNEP, the International Centre for Trade and Sustainable Development (ICTSD) and the European Patent Office found that firms attach slightly more importance to scientific infrastructure, human capital, favorable market conditions and investment climates than IPR in their licensing decisions (UNEP *et al.*, 2010). This study also revealed that 70% of the respondents were prepared to offer flexible licensing agreements to poor developing countries. However, there is evidence that technology transfer is inhibited in countries with high tariffs and lax intellectual property rights.

In addition, environmental externality is one of the biggest impediments of adopting LCT, where private an incentive to reduce the greenhouse gas (GHG) is significantly lower than social incentive. Hence, a lower demand pushes down the price of LCT, which in turn is casting a negative signal towards the investor to invest in the R&D of mitigation technology (Goulder, 2004; Jaffe and Lerner 2001; Newell, 2008; Arrow *et al.* 2009). Hence, the economists very often persuade the government for adopting market approach to address emission through imposing the price on GHGs such as emission tax, tradable permit and so on.

Public R&D investments are most effective when complemented by other policy instruments, particularly LCT (RE & EE) deployment policies that simultaneously enhance demand for new low carbon technologies and create a steadily increasing market. Together R&D and deployment policies create a positive feedback cycle, inducing private sector investment in R&D which in turn further reduces costs and provides additional incentives for using the technology, as seen in Japan with PV and Denmark with wind power. Furthermore, these could promote an increase in LCT shares by helping to overcome various barriers that impede LCT development and deployment.

It is known that energy and resource efficiency are central towards achieving low carbon economy. However, information barriers, uncertainty, split incentives and high upfront costs make the take-up of energy efficiency measures slower than might be expected. Government could provide information and develop tools to enable business to measure and improve their energy and resource efficiency, and address inertia through standard setting and efficiency targets. Examples of government interventions include smart metering, energy efficiency labeling of products, minimum energy efficiency standards and the eco-design for energy-using products directive.

Based on the above discussion, Table 1 demonstrates some barriers to the development and adoption of LCT and potential policy instruments for addressing the barriers towards achieving LCE.

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**Table 1: Barriers to the adoption of LCT towards LCE and potential policy instruments**

Type of barrier	Potential policy instruments
Cost barriers; financial risk; allocation of government financial support; trade barriers	Public support for LCT R&D & policies to support private investment including fiscal incentives, public finance, and regulatory mechanisms, e.g. FITs, quotas, use standards.
Externality – cheap private cost of pollution than social cost	Market approach such as emission taxes; tradable permit; pollution scheme Command and control such as laws and regulation.
Deficient data about natural resources Skilled human resources (capacity) Public and institutional awareness	Resource assessments; energy standards; green labelling; public procurement; awareness campaigns; education, training and capacity building.
Institutional barriers, e.g. existing infrastructure and energy market regulation; industry structure	Enabling environment for innovation; economic regulation to enable access to networks and markets and investment in infrastructure; revised technical regulations.
Issues of intellectual property (IP) rights& technology transfer	Ensuring IP rights for the development of LCT such as patent, copyright and trademark; international support for technology transfer (e.g. under UNFCCC); microfinance; technical training.
Issues related to consumer demand (less) and social acceptance	Awareness campaigns; consumer incentives; community projects; public procurement; governmental (national and local) policy cooperation.

## 4. DISCUSSION AND CONCLUSIONS

Indeed, the adoption of LCT towards LCE cannot take place over the night as there are some key challenges to overcome. In fact, the development of low carbon technologies would require a significant degree of support from both the public and private sector; however, they have the potential to make a very significant contribution to economic growth and job creation. In the case of the UK, the global market value within the low carbon and environmental goods and services sector was £3,046 billion in 2007/8, of which the UK share was 3.5%, or £106.7 billion. There were 881,000 so-called 'green jobs' within the UK in 2007/08; this could potentially grow to over 1.27 million jobs by 2015 (Energy and Climate Change Committee, 2010). So, significant socio-economic opportunities also lie within the environmental and low carbon technology sectors. Thus, investment in low carbon technologies must not simply be seen as part of the short-term economic recovery, but also as a means of encouraging sustainable economic growth over the decades to come.

Timely investment in low carbon technologies would be vital to minimize the cost of making the transition and would provide the potential for business to capitalize on future low carbon opportunities. Climate change is recognized as a key strategic issue in most industries and climate change risks must be embedded in investment decisions, but front loaded capital requirements and stretched payback periods may prove significant barriers. This has been compounded recently as credit constraints and reduced business and consumer confidence have impacted sharply. Investment in clean technology and the supply of venture capital for low carbon activity have fallen recently. The government could play a role in enabling access to capital and targeting those areas where investment is sub-optimal. The government also should provide indirect financial incentives through the fiscal system to encourage the take-up of cleaner technologies and activities aimed at reducing carbon emissions, for example through the Enhanced Capital Allowance (ECA) scheme.



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However, many emerging low-carbon technologies do not appear to be economically competitive in the present and fail to attract sufficient funding from private sources, especially at the early stages of their development where risks tend to be greatest. There is need a range of public and private funding program to support innovation at different stages of maturity for example, supports and invests in technology research, development and commercialization, with a view to accelerating the exploitation of new technologies. However, it is very crucial for businesses and governments to grab the opportunity to generate new markets for low carbon technology. There is a successful strategy in the case of wind turbine technology development in the Danish economy (Kemp *et al.* 2000). They produced commercial wind power during 1970s, which provides 19.9% of total electricity in Denmark in 2008. The Danish government also has a plan to expand the share of electricity generation to 50% of wind by 2050. The same technology could be used to meet the challenge of China's transition to a low carbon electricity system (Kahrl *et al.* 2011) as China has plentiful wind resources, which is around 250 GW is on shore wind and approximately 750 GW is off shore wind resources (Martinot, 2010). China can establish a long term effective mechanism to boost energy-saving technologies and products, and to promote the economic development toward a low-carbon mode (Hou *et al.* 2011).

There is a trade-off between potentially high short-term costs and long-term benefits from investments required for the transition to a low carbon economy. Impacts on business from the transition will vary by sector and by business, according to how prepared they are in terms of the skills, knowledge, finance and flexibility they need to adapt to and adopt new cleaner technologies. The Carbon Trust (2008) reports a company that is well positioned and pro-active could increase its value by up to 80% by making the transition to low carbon based activities and markets. The power, transport, building, and industrial sectors, in particular, have been identified as having significant scope to cut their emissions and to exploit opportunities from low carbon activity and demand.

This article concludes with several interesting findings. *Firstly*, the relationship between economic growth and carbon emission is functional but still economic growth may improve the quality of environment as long as it compensates the environmental cost. *Secondly*, there is a debate about the viability of both market approach and command and control approach but there is a general consensus that LCT is inevitable for LCE. *Thirdly*, economic transition towards the LCE would be attained through market approaches along with public policy, public and private investments in R&D, environmental and social externality, protecting intellectual property rights and global cooperation. *Fourthly*, carbon emission is a global issue, hence LCT diffusion is required from developed to less developed countries through trade openness. *Finally*, it can be concluded that how fast a country can progress towards achieving LCE depending on the following factors:

- Assess the technologies that are or might be available to deliver low carbon energy and increased energy efficiency;
- Research and development as well as promote LCT, e.g. renewable energy, green technology, energy efficiency and carbon capture and storage;
- Education, awareness, training and capacity building program for LCT and LCE;
- Behavioral and lifestyle changes for reducing energy consumption and GHG emissions;
- Reduce energy demand to the supply chain, e.g. production, distribution, consumption and disposal;
- Manufacture of low carbon technologies and products;
- Public and private investment in low carbon economy;
- Alternative fuels for vehicles, energy management, carbon finance, sustainable transport and sustainable building technologies;
- Technology costs (vintages and learning) and fiscal policies (taxes and subsidies in the demand/supply-side);

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- Regulations to adopt new Technologies (e.g., transport shift to electric vehicles) and technology transfers;
- Effectiveness of the current policies and new policies for LCE.

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# LOCAL SOURCES OF CHINA'S FINANCIAL OPENING: THE CASE OF RENMINBI INTERNATIONALIZATION

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**Abstract:** This study unravels the subnational foundation of China's monetary outreach, notably its recent years' endeavor to promote renminbi internationalization. Contrary to most analyses in economics and policy literatures that conceive the importance of the central authorities in China's pursuit of external monetary policy objectives, policy making dynamics underlying the evolution of the different tracks of renminbi internationalization, including the development of offshore renminbi bond market and trade settlement regime, suggest a far more complicated picture about the political origins of the internationalizing venture of renminbi. Through extensive review of published materials in Chinese and interviews with financial officials, local authorities of offshore and onshore financial hubs, including prominently Hong Kong and Shanghai, are found to have played important parts in defining the central government's agenda, shaping the choice of financial standards and implementation specifics like scope, pace and timing of the currency outreach. These findings points to the imperatives of going beyond the national level of analysis and looking into the subnational dimension of financial opening often overlooked by researchers.

**Keywords:** Financial Opening, China, Local Government, Currency Internationalization, Renminbi

## 1. INTRODUCTION

China's financial opening has been a subject of much discussion in recent years. The previous decade has witnessed not only the liberalization of Chinese current account that paved the foundation of its integration to the global trade system, but also some advances in financial opening. These include, for example, the introduction of foreign investors to the domestic equity and bond markets, overseas portfolio investment of domestic institutional investors and increasing international footprint of the country's currency, renminbi.

Despite much interest among financial practitioners and economists on the development, analysts have yet fully grappled with its political economic origins. Economics and finance literatures often points to economic gains like slowing down the build-up of US dollar reserve and reduced transaction costs through re-denominating trade flows. Recent contributions by political scientists, on the other hand, suggest far more nuanced possibilities. For instance, renminbi internationalization is conceived to be a political lever pursued by the central bank to accelerate domestic financial reforms that have lost much traction due to resistance from the state-owned sectors. Others highlight the partial and selective nature of the pursuit, which has been constrained by the gains of the leading banks, virtually all of them state-owned, in an economy with low capital account openness. These works, however, have scantily looked into the subnational dimension of the larger process, especially the roles of local authorities of leading financial hubs in China like Hong Kong and Shanghai, respectively the leading offshore and onshore renminbi centers of different market niches. This study examines their influences in the making of two important facets of renminbi

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internationalization that are widely recognized to have yielded the most success so far—the offshore renminbi bond market and renminbi trade settlement regime. Through extensive review of publicly available media accounts, specialized publications of stock exchanges and financial institutions in both English and Chinese and interviews with mainland policy officials, this study finds that local authorities of Hong Kong and Shanghai have played important parts in defining the central policy agenda, shaping the choices of financial standards, and implementation specifics like scope, pace and timing of the opening initiatives.

### 2. EXISTING EXPLANATIONS OF CURRENCY INTERNATIONALIZATION

Economists and finance specialists on renminbi internationalization tend to focus on the external policy objectives of China's monetary authorities and implications of the ascent of renminbi, like the prospect of its challenge to the U.S. dollar and its connections with China's monetary policy that affects its value and the larger global trade balance. Cheung *et al.* (2011) argue that renminbi internationalization represents a policy-driven strategy to reduce exposure to the specific risk underlying China's international balance sheet. Similar account by Ramos and Sahi (2010) also notes that the Chinese authorities seeks slowing down China's build-up of U.S. dollar foreign reserves, re-denominating trade flows from U.S. dollars or euro into renminbi, and opening some channels of offshore renminbi funds returning onshore *in a manageable non-disruptive way* and keeping some level of capital control/bank pricing control onshore for some time to come.

Yet little has been written on the domestic aspects, especially the political sources of the internationalizing initiatives. Recent studies have unpacked bureaucratic politics at the central level. Subramanian (2011), for instance, argues that China's internationalization posture is derived primarily from both nationalist sentiment and efforts of the central bank seeking "exit" from mercantilist policies and warding off domestic resistance to further capital market reform at home. Likewise, Pettis (2012) contests that PBOC was pushing hard for renminbi internationalization not because it is truly good per se, but because of the fact that the pace of domestic financial sector reform is increasingly becoming "despondent." Only though a "risky move" like capital account opening could it re-gain momentum

Kroeber (2013) and Thornton (2012) also adhere to such instrumental views, and see the initiative as a "lever" of domestic reform. The two, however, point to an opposite judgment about the international outlook of renminbi. Rather than eclipsing the U.S. dollar as Subramanian (2011) foresees, the domestic divides within the financial bureaucracy suggest that any optimistic assessment of renminbi's rosy future is far-flung. However, the discord and competing preferences within the financial bureaucracy have received attention only lately. Mallaby and Wethington attribute the incoherence and partiality of renminbi internationalization to internal splits. Cohen similarly observes that the Chinese authority is riding "on the cheap—to make as few concessions as possible in terms of either political or financial reform" (Cohen, 2012a).

Like the domestic financial reforms Shih (2007) investigates, renminbi internationalization remains selective, partial and incomplete (Mallaby and Wethington, 2012). But these authors have fallen short of mapping out the contours of players holding various views. At the sectoral level, Helleiner and Malkin (2012) look at the state's financial constituencies and suggest that its dependence on leading banks as the hub of China's credit system for the state-owned economic sector discourages full liberalization of currency control. This diverges from Broz (1999) and Henning (1994) with regard to the roles of financiers as promoter of currency internationalization in other national contexts.

These advances on bureaucratic and sectoral dynamics shed light on the domestic sources of policy making, but they are far from offering a complete picture. Indeed, it would be more appropriate to conceive the evolution of renminbi internationalization as a totality of separate

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but related sub-cases. As the customary distinction in the literature about the various functions and uses of an international currency would suggest, renminbi internationalization could hardly be seen as a single and unitary episode, exhibiting uniform progresses in its maturation as reserve currency, and as an invoicing medium for trade and investment (Cohen, 2012b). Existing analyses of currency politics at the center therefore appear too static and assume unchanging preferences among bureaucratic entities. As a result, they do not capture many of the shifts of central dynamics in the various aspects of renminbi internationalization. On the other hand, contributions to the sectoral interests provide in-depth insights on the context-specific understanding with respect to the potential gains and losses of the process, but they too have not looked into the diversity of financiers' positions on the different facets of the renminbi's international outreach.

### 3. LOCAL STATE AS POLICY DRIVER

Perhaps most importantly, largely missing from these works has been the roles of local authorities. For instance, while Hong Kong's place as an offshore renminbi hub is frequently noted, its roles in initiating and strategizing the endeavor are seldom recognized. Shanghai and other onshore financial hubs also escape researcher's attentions almost entirely. Even in the political economy scholarship of financial liberalization, the analytical focus has scantily gone beyond the central level in looking into the local and inter-governmental dynamics. This is partly understandable given the dearth of connection between the international political economy literature and studies of regional development. This, however, misses an important analytical dimension in understanding the political economic origins of renminbi internationalization.

Such omissions result in gross generalizations of the process. Subramanian (2011), for example, describes the Chinese strategy of currency internationalization as "typically Chinese," characterized by "interventionist opening" and "liberalization via enclaves." It is "controlled, discretionary and micromanaged, even if the ends are liberalizing," and displays similarity to trade opening where "islands of openness to trade and foreign direct investment were created in the form of special economic zones." These features, however, are hardly peculiar to China and its economic and financial domains (Palan, 2006; Zeng, 2010; Zweig, 2002).

By contrast, it has been common for China specialists to dissect the interaction between Beijing and the local governments as an integral part of their analyses. But understandably, the literature tilts toward policy issues like tax and fiscal reform, budget allocation and distribution between levels of government (Montinola *et al.* 1995; Tsui and Wang, 1994). The autonomy and maneuverability of the local authorities remains a subject of much debate. Heilmann (2008) affirms the roles of localities as sites of policy experimentation. Selected localities are important to the central authorities as hosts of new market practices, actors and institutions. Specific forms of experiment depend on two major factors: the level of policy risks (extensive or limited) and involvement of new actors in policy making. Jarvis (2011) also notes that the central authorities continue to play important roles determining "the timing, pace and economic and spatial configuration" of the domestic market. Central-local relations remain a prominent institutional constraint working against Shanghai's ambition to become the champion of the regional "race for the money." The city's financial ascent is derivative of the central government's development strategy at the local level, and this creates tensions between national objectives and local needs, and market requirements and practicalities of financial sector governance. Such assessments, however, privilege the center and appear to circumscribe the influence of subnational entities.

Others see a relatively greater agency of the subnational authorities. As Xu (2009) comments, "the central-local games determine the operation of the financial system. These games deeply affect the finance of most projects. Subnational governments' influences were

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prevalent and are not negligible in lending decisions of local branches of major banks; and they are important players of financial market regulation.” With regard to financial opening, however, given the central government’s inclination to maintain the interests of the core constituencies and implications on systemic stability of the larger financial system, it is not plausible to have a case in which local experiments entirely evade central government’s intervention. But that does not imply the local actors could be dismissed readily.

As Li (1998) suggests, two general forms of discretionary behavior could be discerned in the Chinese political economy— bargaining and implementation deviations. The former occurs throughout policy formation and deliberation before the policy is introduced officially. Local actors try shaping the policy agenda or seeking supports for policy in their favor. Implementation deviation refers to the leeway local authorities look for in interpreting and implementing the policy if the details and particulars are left vague or appear flexible. Not all these possible discretionary behaviors, however, are always feasible. It depends on whether local lobbying targets the center and the extent to which it involves the central planning and policies. When the local behavior depends on the center’s reaction and involves existing planning, local authorities could at best ask for favorable central policies and/or direct supports, like budgetary resources and bank finance. Flexible interpretation of policy serving local ends is possible when the local interests act on issues that have little bearing or significance to the center and gears toward local planning or markets.

Although Li develops the framework in connection with investment liberalization in the early reform years, it suggests that even though in cases when the center is seen as predominant in policy choices, local authorities still retain discretion and maneuverability in interacting with the center. And one should not be surprised to find similar dynamics in financial development and liberalization. Ever since the early days of reform, local officials have taken the lead in fostering capital markets (local stock exchanges and derivative trading, for example) for local economic interests well before Beijing has a clear sense of how to regulate the market activities. They have also pioneered various financial reforms in equity markets on a largely decentralized basis (Green, 2001; Walter and Howie, 2003). Although local authorities could no longer pursue initiatives at their own will and were becoming more dependent on the center’s imprimatur when the regulatory stricture consolidated, they have turned to other channels of influence and employed multiple strategies in order to shape the center’s policy positions and advance their interests.

Often time local authorities would ally with financial interests in shaping the policy agenda and framing the issue in their favor, and leverage connections with bureaucratic actors in order to obtain their support (agenda setting and leverage politics). They would also offer concessions with dissenting parties through accommodating their demands over financial standards and implementation specifics involved, like the scope, pace and timing of the opening initiative (concessionary politics). These locally initiated policy innovations are important in shaping the course of renminbi internationalization. They are more than “freewheeling trial and error or spontaneous policy diffusion” as some would describe. Guided by purposeful local authorities, they generate policy solutions that are often incorporated into the national policy agenda and deliberation at the central level and might eventually be extended to larger scales (Heilmann, 2009). Analyses of the domestic political economy of renminbi internationalization would therefore be incomplete without regard to the roles and effects of local players that are consequential to shaping the policy trajectory.

The following sections examine these local dynamics in the development of offshore renminbi bond market and trade settlement regime, the two most successful facets of renminbi internationalization until to date.



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## 4. OFFSHORE RENMINBI BOND MARKET

The various facets of renminbi internationalization were not introduced at the same time. They were phased in over the 2000s gradually by the Chinese authorities. These began with the offshore renminbi businesses largely confined to individual needs like deposit, remittance and exchange, and credit services since 2004 in Hong Kong, after lobbying efforts of the offshore authorities and financiers with the central authorities lasting for more than three years. Shortly after the personal renminbi businesses were introduced, the offshore community wasted no time pursuing their next targets - renminbi bond issuance and trade settlement scheme, both of which represent important policy breakthrough in the course of renminbi internationalization, testing the suitability of renminbi for investment/reserve and trade invoicing purposes.

### 4.1. Agenda setting and leverage politics

Hong Kong's financial officials hoped that renminbi bonds would bring traction to the local fixed income market that was dwarfed by the predominance of equity financing and bank loans (taking up respectively 70% and 23% of the city's financial market in 2003). The Hong Kong Monetary Authority, for example, noted that with the advent of the regional bond market initiatives pioneered by Asian Development Bank (ADB) after the regional financial crisis, Hong Kong was best positioned to play an important role spearheading the fixed income market on China's soil well before the country was ready for the foreign entry of issuers and investors. Accordingly, HKMA slated development of renminbi bonds as one of the top three policy priorities in 2004, together with a renminbi trade settlement and financial products (Hong Kong Economic Journal, 2004).

The local quest was joined by offshore financiers who expected enormous business opportunities. They regarded the fixed income products as a safe and low risk investment of offshore renminbi funds that had little use besides individual or business purposes, and hoped that the budding bond market would attract multinationals with Chinese business to raise lower yield renminbi funds offshore. These rationales were acknowledged by China's central bank, the People's Bank of China (PBOC) and foreign reserve manager, the State Administration of Foreign Exchange (SAFE), which had been frustrated by the lengthy negotiations between foreign issuers and the mainland authorities over compliance and reconciliation with the Chinese financial standards insisted by their bureaucratic counterparts like the Ministry of Finance (MOF). SAFE officials tossed the possibility of having the offshore renminbi bond in early 2005 as an alternative to the panda bond. It considered the offshore venue as a pilot platform for fostering fixed income markets in local currency before the country was ready. The central bank also turned positive over the summer (Wenweipo, 2005).

Their support, however, did not materialize in any sign of policy change until 2007. At the central level, the National Development and Reform Commission (NDRC) and MOF as well as the banking regulator were reserved about the offshore bond initiative. First, it was in conflict with the policy priority championed by MOF and NDRC. They were reportedly opposed to the initiative because it would threaten their say and influence over the domestic bond market. In fact, it coincided with the onshore bond market opening in 2004 that was intended to be part of the Asian Bond Market Initiative to kick-start the regional market. This would follow similar issuances in Singapore and Hong Kong that were denominated in local currencies and pave the way for issuances of two ten-year species by the Asian Development Bank and International Financial Corporation in renminbi (i.e. the panda bond) scheduled for the next year. With domestic market development topping the policy agenda, Hong Kong's call was turned away (Mingpao, 2005).

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Second, offshore bond issuance in renminbi involved technical challenges far more complicated than the panda bond. Any regulations governing remittance of bond proceeds were lacking, which posed considerable policy risk to both MOF and NDRC. Third, they were at the time also preoccupied by systemic risk implications in that the offshore products might affect the pricing and interest rates on the mainland together with the wider risks of capital market opening like illicit capital outflow. The top decision elites were evidently convinced by such concerns. Premier Wen Jiabo cautioned that any arrangement of offshore bond issuance must not result in “the loss of state-owned asset.” Fourth, Hong Kong did not appear to be an effective substitute to the mainland market since the anticipated market scale appeared questionable. Offshore renminbi deposits at the time were not sufficiently large to absorb any large issuances. The offshore market at the time, both primary and secondary, also lacked market depth. Further, on the supply side, domestic financial institutions had little need of raising capital in the bond market (Lin, 2006).

Accordingly, despite the successful efforts to shape the policy agenda and to acquire the support of PBOC and SAFE, Hong Kong’s initiative met opposition at the center and failed to entice the interest of onshore financiers. Policy stasis was maintained. But, to signal its political support and placate the offshore community, PBOC eased controls of personal and business uses of renminbi in late 2005, a move that was solely under its authority.

### 4.2. Concessionary politics

The quest for an offshore bond market did not die out, however. The local parties, together with its central patrons, made concessionary efforts to address the concerns of the opposing parties, especially policy risk implications foreseen by the decision elites and the lack of requisite regulation and technical agreements. They also found new allies from the financial industry and bureaucracy.

To ease the larger concern that the offshore platform would be entirely dictated by market forces, carrying possible implications on the mainland’s financial parameters, the offshore renminbi bond would be priced on the basis of domestic benchmark yield, the Shanghai Interbank Offered Rate (SHIBOR) that went on trial since 2006 and was officially brought on to the market in January 2007 (Hong Kong Economic Journal, 2007).<sup>1</sup> This not only resulted in wider use of the rate beyond the domestic market, it also appealed to the mainland financial interests (especially banks) since it would retain their influence over the rate as contributor banks. Shanghai found the arrangement palatable too, as it had for years backed the development of SHIBOR and its principal architect, the National Interbank Funding Center.

On the technical front, HKMA developed a renminbi real time gross settlement system that ran parallel to those of other hard currencies to make possible multi-currency transactions by issuers and investors. This matched the central bank’s effort to firm up the procedures governing remittance of bond proceeds to the mainland. Perhaps more importantly, the central bank and offshore community agreed to have the NDRC, the dissenting agency, defining issuers’ eligibility and scale of issuances. Since its stake over bond market development would stay intact (and might even grow with its reach extending to the offshore market), it was hoped that this would solicit the commission’s support.

Policy breakthrough came in January 2007 when the State Council sanctioned renminbi bond issuances by mainland financial institutions with high credit ratings, followed by a joint PBOC and NDRC promulgation of the regulation in June. Both agencies would review

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<sup>1</sup> SHIBOR was pioneered by the National Interbank Funding Center located in Shanghai; the interbank body also has the other identity as China Foreign Exchange Trade System handling forex, bond and derivative trading involving renminbi and foreign currencies.

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applications of the interested institutions, but NDRC retained final say on the issuance scale. Beyond the technical preparations and concessionary efforts of the Hong Kong authorities that turned NDRC's position, onshore financiers also pressed their bureaucratic patrons to steer their positions.

Though some of them viewed with skepticism the financial value of offshore bond issuance, the "policy" banks that relied almost exclusively on debt financing were eager to expand the source of capital beyond the onshore market.<sup>2</sup> With top credit ratings and the state's backing, they could raise funds offshore with ease despite the lower coupon rate at home (Yu, 2007). Led by politically well-connected governors, this brought extensive support from the top state and party elites. This catalyzed issuance of the first offshore renminbi bond in July 2007 by the China Development Bank, the largest policy bank of China. This was followed by ten offshore debt issuances by policy and commercial banks in 2007 and 2008 that were oversubscribed by offshore investors who found virtually no other investment opportunities. From then, the offshore renminbi bond market burgeoned and outgrew the scale of onshore renminbi bond issuances by foreign entities in China.

### 5. REMNINBI TRADE SETTLEMENT SCHEME

The other area of renminbi internationalization that witnessed exponential growth concerned international trade, specifically renminbi trade settlement. Like the offshore bond market initiative, it originated as part of the initiatives developed by Hong Kong Exchanges and Clearing (HKEx) and the government in the mid-2000s.

#### 5.1. Agenda setting and leverage politics

Following the first offshore renminbi bond issuance in 2007, the offshore community turned to trade settlement as its next opening agenda. In its view, besides a better handling of currency risk when invoicing trade in foreign currencies and easing trade-related payments, it would also consolidate the city's niche in renminbi businesses. Offshore banks saw a better return from renminbi funds in trade financing than simply parking in debt instruments or surrendering the fund to the clearing bank in Shenzhen, which earned minuscule interest. It also helped spur the growth of the offshore loan market in the interests of the financiers (Hong Kong Economic Times, 2008).

Early local lobbying met little success except friendly gestures from PBOC. The offshore community was unable to shape its policy agenda and amass political backing. The looming global financial crisis steered away all support Hong Kong could obtain as the country weathered the economic downturn. But the crisis also presented a juncture of policy breakthrough galvanized by a changing domestic economic context.

Trade settlement was increasingly understood in connection with a number of larger economic issues that topped the decision makers' agenda. This turned the tide in favor of the offshore authorities calling for the scheme. While the mainland banking system was not severely affected by the crisis, growth of the real sector was challenged by slowdown of exports. Especially alarming to the financial bureaucracy was the heightening risk of bankruptcy of thousands of small and medium enterprise in Shanghai's vicinity and South China, which found increasing difficulties of obtaining trade credits from foreign banks. The

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<sup>2</sup> The policy banks include the Agricultural Development Bank of China, China Development Bank, and the Export-Import Bank of China. All of them were founded in 1994 as a result of banking sector reform spinning off government-related and policy-oriented investments and financing activities from leading state-owned banks. In terms of financing structure, China Development Bank is the second largest bond issuer in China, after the government bond of the Ministry of Finance. Recent figures can be found at Goldman Sachs Asset Management (2013).

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Ministry of Commerce and PBOC were also alerted to the currency risk of trade invoicing in U.S. dollars borne by domestic exporters.

In their assessment, should renminbi be adopted as settlement currency, domestic banks and their offshore subsidiaries could provide trade credit. The settlement period would also be shortened as firms would no longer need to exchange for U.S. dollars in international trade. It also shielded exporters from the risk of currency volatility (Fu and Yu, 2008). As China was putting together responses to cope with economic challenges, these rationales raised by the offshore community as policy merits underlying renminbi trade settlement found strong echoes at the center.

Hong Kong also extended its reach to subsidiaries of mainland banks in order to solicit their supports. Besides Bank of China that was bestowed with the market monopoly of handling settlement ever since the individual renminbi businesses were introduced in the early 2000s, all other major state-owned banks had set up their offshore footprints over the decade. They welcomed the settlement initiative that would bring enormous growth potential to their businesses. Their mainland parent companies also recognized it as an important internationalizing opportunity. To carry out trade settlement in renminbi, banks would be required to streamline their cross-border clearing and settlement services and expand their overseas branch networks to stay competitive (Development Research Center of the State Council, 2011). Accordingly, they responded to the calls of their subsidiaries and successfully drew the interest of the banking regulator.

On the other hand, deliberation of trade settlement was linked with the development of the offshore renminbi bond market. Despite strong market interest in renminbi fixed income products, the scale of offshore renminbi funds posed a limit on the market growth. Faster approvals from NDRC and more frequent issuances did not appear to resolve the problem. Through the trade settlement regime, both the local and central authorities expected to generate a large pool of funds offshore that would be made available for investors in demand of offshore renminbi bonds.

Against these merits, the renminbi trade settlement program was favored by a number of bureaucratic entities. NDRC, MOF, the Ministry of Commerce and banking regulator sided with the PBOC. Joined by both onshore banking interests, these brought significant leverage to the Hong Kong authorities. In late December 2008, the State Council gave a green light, followed by a swap agreement between PBOC and HKMA the next month that would provide a maximum of 200 billion yuan to the offshore financial institutions to meet liquidity need in trade settlement. Yet in practice, the program was not monopolized by Hong Kong as it had anticipated.

### 5.2. Concessionary politics

Unlike the development of offshore bond market in which Hong Kong met no local contender, the birth of trade settlement regime was complicated by dissenting local interests. While it was true that Hong Kong was preferred and backed by the central bank and others in the bureaucracy, this did not stop Shanghai from joining the contest. Soon after the city was named China's future international financial center in March 2009, Shanghai also sought to introduce trade settlement simultaneously with Hong Kong as the very first step boosting its international status and outlook. Besides handling trade with neighboring economies like Hong Kong, it also intended to cover transactions with Taiwan, ASEAN and the former Soviet states. Such a scope would be far more ambitious than what the PBOC had in mind (Deng, 2009).

Though PBOC and the banking regulator were initially disinclined to revise the regulation that would allow overseas banking unit accounts for foreign companies needing to handling

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trade-related payments onshore, such technical hurdles did not put an end to the local pursuit. Shanghai moderated its proposal and indicated that the scheme would be eligible to foreign firms with headquarters in the city only and hoped to obtain the center's blessing.

In the face of the onshore quest, the offshore community was concerned that their project would be derailed by the opposition of onshore local authorities. To prevent this from happening and to ensure the political commitment of the bureaucratic entities on its part, it raised no objection to having Shanghai as secondary host of the trade settlement initiative and agreed to expand the regime's scale in response to onshore local interests. Such a concession bought Shanghai on its side and maintained the political consensus within. It also provided the financial bureaucracy with policy leeway. Accordingly, the scale of renminbi trade settlement regime introduced in July 2009 was deliberately structured to take into account of the interests of multiple localities.

Offshore in Hong Kong, cross-border trade between Shanghai and four cities in Guangdong Province (i.e. Guangzhou, Dongguan, Shenzhen and Zhuhai) with Hong Kong, Macau and ASEAN states would be handled in a pilot renminbi settlement scheme that would benefit 365 designated enterprises in settlement of import/export payments of goods. At the same time, a parallel arrangement was created onshore that allowed for "direct" settlement between foreign firm and mainland "correspondent banks," many of which had significant presence in Shanghai. As the ensuing analysis suggests, besides providing additional market conduits for firms, this also served the political ends of balancing local interests with similar interest of the opening initiative. Indeed, considering the fact that since the scheme's inception, a large part of trade settlement went through the Bank of China (Hong Kong), the offshore clearing bank, the political rationale appeared to play a larger part than market demand in deliberation of its implementation specifics (Fu, 2009).

The restricted scope in the early phase, however, had barred a large number of interested firms from participating in the renminbi trade settlement scheme. In a move ostensibly to boost the program's appeal after a lukewarm first year, the geographic reach was dramatically expanded to include 20 provinces and municipalities in China and all countries and regions overseas in 2010. Eligibility was extended to all potential importers and services businesses despite some restrictions maintained on exporters of goods. As a result, the number of eligible enterprises that could settle merchandize exports in renminbi jumped from 365 to 67,359 by the end of 2010. This led to an 874% growth of renminbi trade settlement between October 2010 and June 2011 that accounted for about 10% of China's total trade in 2011, 92% of which occurred in Hong Kong (SWIFT, 2011). Geographic restriction of domestic firms was rescinded in August 2011. Potentially all domestic enterprises licensed to conduct foreign trade became eligible participants.

The exponential jump of renminbi trade settlement activities benefited not only the offshore financiers (and to some extent Shanghai), onshore banks and their subsidiaries took a disproportionate percentage of the business. BOC's share of trade settlement jumped 457% between 2010 and 2011; China Merchant Bank also recorded four-fold growth through the period (Lam and Ho, 2012). Politically, this not only consolidated Hong Kong's niche in the development of offshore renminbi businesses, it also strengthened the support of financial interests as they reaped enormous material gains. Bureaucratic entities like PBOC, NDRC and the banking regulator backing the venture also had their interests served and promoted. The central bank in particular was acclaimed at home and abroad as the principal architect driving renminbi internationalization, making possible renminbi trade settlement and bond issuances offshore in a few years' time

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## 6. CONCLUSION

This study presents a domestic political analysis of the policy trajectory of renminbi internationalization, centering on the local/subnational origins of the “big bang” development in the offshore renminbi bond market and trade settlement scheme in the late 2000s. Different from most studies, it does not see renminbi internationalization a single and unitary episode, exhibiting uniform progresses in its maturation as reserve currency, and as an invoicing medium for trade and investment. Rather, as the discussion has demonstrated, it shall better be conceived as a totality of separate but related sub-cases, each involving different political economic dynamics in their unfolding.

More importantly, even though with little doubt monetary policy concerns play parts in shaping the decision makers’ calculus, lest not forget that the decision making in China (as in elsewhere) unfolds in political contexts. And unlike the advances in recent years, this study explores the political nature/context of renminbi internationalization beyond the central level. While internal dissension is not only uncommon inside the central financial bureaucracy, at subnational level too local authorities of financial centers also play important part in shaping the central opening agenda, actively seeking bureaucratic supports, shaping but more often offering concession with dissenting parties over financial parameters and implementation specifics. These have found empirical support in the takeoffs of offshore renminbi bond market and trade settlement scheme, and suggested that understanding the subnational (and inter-governmental between the local and central authorities) dynamics would yield important insights on the course and outcomes of renminbi internationalization.

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# FEASIBILITY OF THE WIND FARMS: CASE STUDY IN TURKEY

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**Abstract:** Renewable energy is not only a trending subject in sustainability studies, but also a hot topic in energy economics. Developing countries require high cost fossil fuel energy given the abundance of labor-intensive work, which causes both environmental pollution and dependence on *external* resources. Turkey may prove to be a vast resource of renewable energy such as solar energy, wind power, and geothermal energy to supply its population of 75 million. This paper focuses on wind power and attempts to financially analyze the aggregate feasibility of the wind farms in various sites. These sites are evaluated with respect to investment, maintenance and operating costs considering the time value of money. Payback analysis is employed to establish the validity of total investment, whereas annual worth (AW) method is used for economic evaluation of the wind farms. The aim is to justify the use of wind power as an alternative to conventional energy systems.

**Keywords:** Wind Farm, Feasibility, Economic Evaluation, Annual Worth, Payback

## 1. INTRODUCTION

The ruthless energy consumption engendered by the industrial revolution reached a saturation point with global energy crisis in the 70's. The quest for sustainability and renewable energy began as humanity understood that its most vital resources are not limitless. Technologic advancement, government policies and economics drivers enabled the quick rise of the wind energy in this aspect (Windustry, 2012).

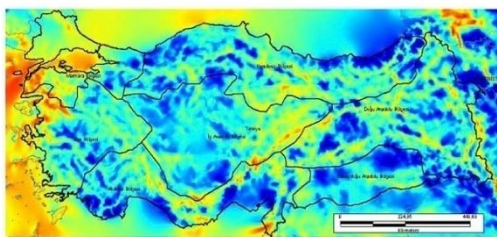
The key drivers of wind energy are threefold: (1) Economical drivers such as price stability and cost effectiveness, (2) Environmental drivers such as cleanness and land preservation, and (3) Social drivers such as energy independence and supporting of local businesses (Windustry, 2012). On the other hand, the negative impacts of the wind energy are low, local, and manageable and it constitutes the most economical form of renewable energy (Yaniktepe *et al.* 2013).

As a country with high youth population, the estimated energy consumption of Turkey is projected to be around 530,000 GWh in 2023. As a result of this consumption, Turkey is a net energy importer with an import ratio of 66% and with the current growth rate. The highest portion of the big energy demand of the country is supplied by fossil fuels (Melikoglu, 2013).

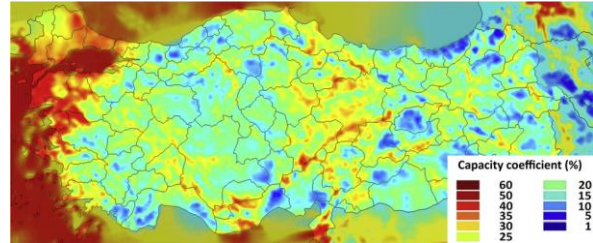
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This dependence on fossil fuels results in environmental as well as political consequences. These problems may be easily overcome by renewable energy.

Turkey is a vast country with different climate properties at various sites, which in return enable the country to employ different renewable energy types at proper locations. However, aside from hydropower, renewable energy constitutes less than the 1% of total energy production (Melikoglu, 2013). Given this opportunity, it is reasonable to invest in renewable energy as part of the growth agenda, Vision 2023 (Turkish Government, 2011).



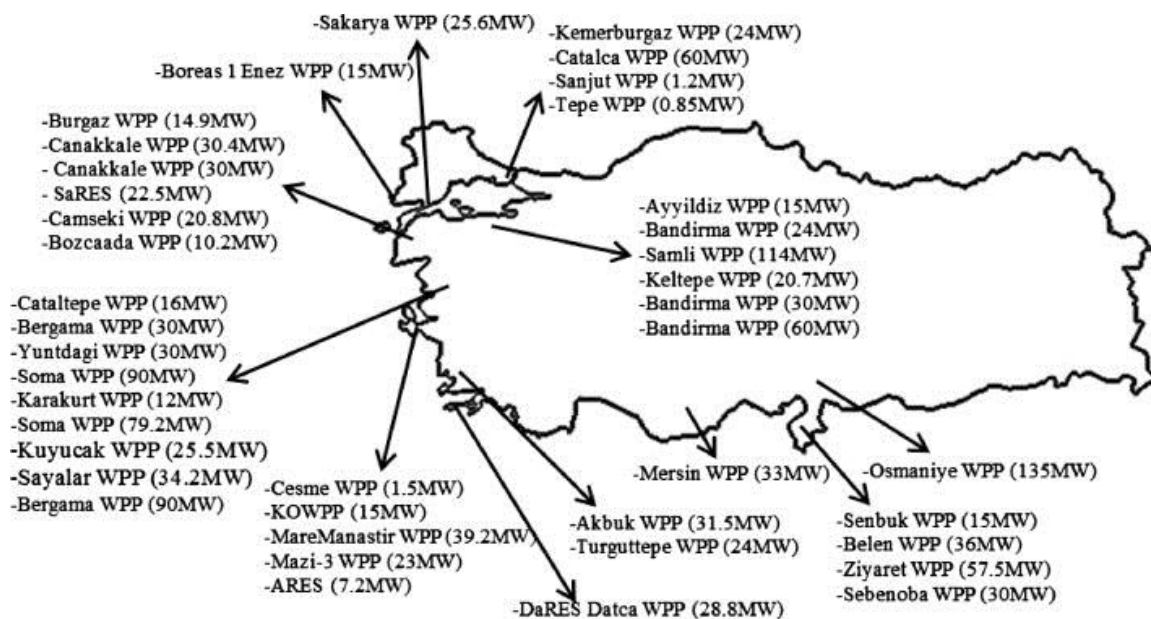
**Figure 1: Wind Atlas of Turkey**



**Figure 2: Wind capacity coefficient of Turkey**

**Source:** Turkish General Directorate of Renewable Energy, 2010. <http://www.eie.gov.tr/yenilenebilir/ruzgar.aspx>

Turkey has a theoretical wind energy potential of 160 TWh and around 75% of this potential is technically feasible (Melikoglu, 2013). However, economically viable wind power potential of the country is 48,000 MW (Yaniktepe *et al.* 2013). The technical potential constitutes the higher share in Europe (Oner *et al.* 2013). It is important to study various locations in order to assess their potential before the decision on any wind farm construction (Oner *et al.* 2013). The most profitable sites in Turkey are Marmara Sea region, Mediterranean Coast, Aegean Sea Coast, and the Anatolia inland (Yaniktepe *et al.* 2013). Figure 1 displays the wind atlas of Turkey and Figure 2 shows the wind capacity coefficient, which provides general information about the high potential of wind energy. An economical wind farm requires a capacity factor of at least 35% (Oner *et al.* 2013).

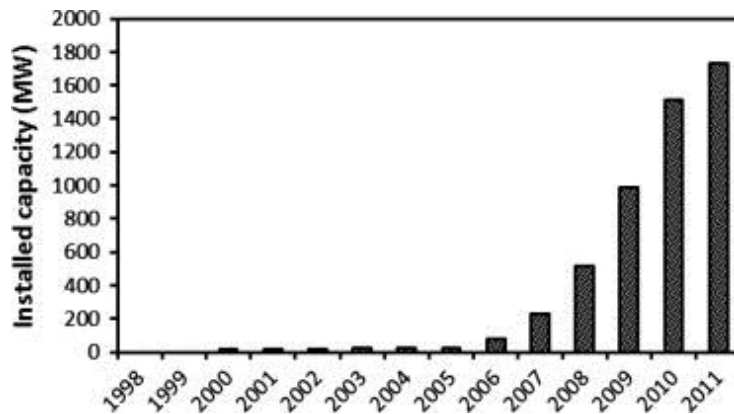


**Figure 3: WPPs of Turkey**

**Source:** Yaniktepe *et al.* (2013)

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The first wind power plant (WPP) was built in the Izmir-Çesme region in 1998 with an installed capacity of 1.5 MW. 120 new WPP applications have been made to get generation license at the end of 2009 (Capik *et al.* 2012). All these plants are closely monitored by RITM, Centre for the monitoring and forecasting of wind power, where there is an ongoing project called “Monitoring and Forecasting System Development for Wind Generated Electrical Power in Turkey”<sup>1</sup>. The project is discussed in the next section. The active WPPs are displayed in Figure 3. The licensed capacity of WPPs in Turkey is 2,572 MW whereas the capacity of WPP under construction is 708.55 MW (Yaniktepe *et al.* 2013). Figure 4 clearly shows that investment in wind power is increasing exponentially, which demonstrates the trend in the environmentally conscious energy production.



**Figure 4: Wind power production trend**

Source: Yaniktepe *et al.* (2013)

Wind energy topic has a lot of influence in Turkish academia. Recent publications include Ilkilic (2012), who studies the wind energy potential in Turkey. In addition, an assessment of wind characteristics is conducted and WPPs are investigated. Melikoglu (2013) conducts a feasibility analysis on Turkey's renewable energy agenda and concludes that wind energy must be combined with other energy to assure steady supply. Oner *et al.* (2013) study the wind potential of Intepe region. They also design a potential wind farm on the mentioned region. Yaniktepe *et al.* (2013) review the current status and the potential of wind energy by exploring installed and projected wind farms of Turkey.

In the light of these facts, this paper attempts to analyze the feasibility of WPPs in Turkey with an economical perspective. The paper is organized as follows: The next section discusses the economical aspects of WPPs. Chapter 3 conducts a case study and the paper concludes with a few remarks.

## 2. ECONOMICAL BACKGROUND

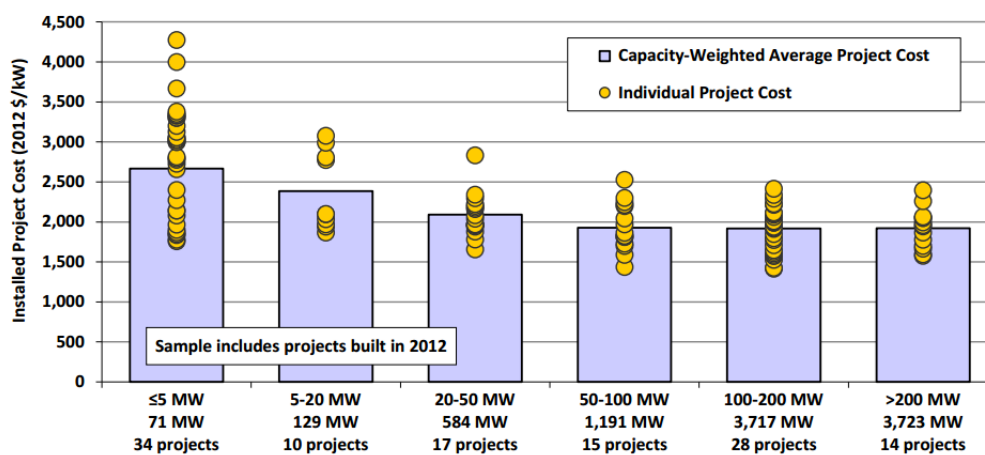
Average installed wind power project costs exhibit economies of scale, especially at the lower end of the project size range (US Department of Energy, 2012a). Figure 5 shows that, among the sample of projects installed in 2012, there is a steady drop in per-kW average installed costs when moving from projects of 5 MW or less to projects in the 50–100 MW range. As project size increases beyond 100 MW, economies of scale appear to be less prevalent. Furthermore, based on installed cost data available for 26 utility-scale distributed wind projects (i.e., greater than 1 MW in size), totaling 78 MW installed, shows that for the projects 5 MW or less, average installed costs is approximately \$2,500/kW, where as in the 20 – 50 MW range, it is approximately \$2,100/kW with a steady drop (US Department of Energy, 2012b).

<sup>1</sup> <http://www.ritm.gov.tr/root/index.php>

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The projects installed over the past decade have, on average, incurred lower operations and maintenance (O&M) costs than older projects in their first several years of operation. It is observed that O&M costs are higher with older wind turbines given that component failures become more common, and manufacturer warranties expire. On the other hand, projects installed more recently, with larger turbines and more sophisticated designs, may experience lower overall O&M costs on a per-MWh basis (US Department of Energy, 2012a).

Based on financial statements of two major US companies from the wind industry, total O&M costs are \$23.2/MWh and \$23.9/MWh, respectively, for their U.S. wind project portfolios in 2012. The first one states that the cost consist of 17% of asset management and administration, 46% of turbine O&M, 10% of balance of plant and 27% of other direct costs. On the other hand, the second company breaks out the total into three categories: 63% of supplies and services, 16% of personnel costs, and 21% of other operating costs, which mainly includes operating taxes, leases, and rents (US Department of Energy, 2012a).



**Figure 5: Installed Wind Power Project Costs by Project Size**

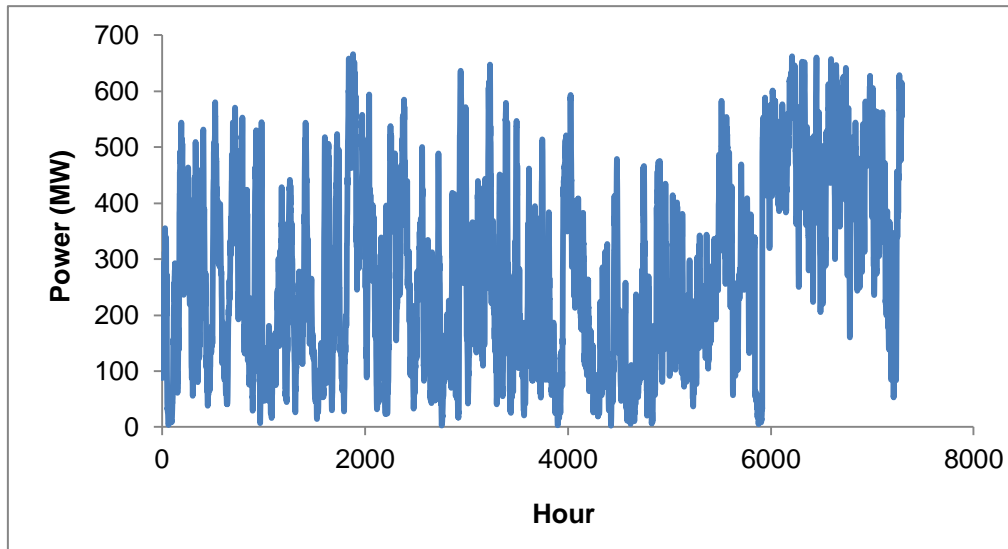
Source: US Department of Energy (2012a)

### 3. CASE STUDY

In Turkey there are 55 active WPPs with a total capacity of 2,572 MW. According to the strategic plan of Ministry of Energy, the objective is to increase the total active wind power capacity to 20,000 MW by year 2023. The purpose of the RITM project is to provide large-scale integration of WPPs into the electricity system of Turkey. In this context, a wind power monitoring and forecasting system is developed and disseminated throughout Turkey. Instant electric production of connected power plants can be monitored and future values can be forecasted. The system provides different type of forecasts for different time scales depending on the intended use to control the turbines, to manage the power system and energy trading, and to maintain the system. As of the end of year 2012, 14 power plants that have a total capacity of 700 MW were connected to the system. Currently total capacity monitored is 1,038 MW. The objective is to connect all the active power plants to the system.

The data depicts the total electrical energy production in 14 power plants that have a total capacity of 700 MW from RITM between November 2012 and August 2013. It contains the total energy generated by the power plants each hour. Figure 6 and Figure 7 display hourly and monthly electrical energy production data, respectively. Average energy production throughout 10 months is 275 MWh.

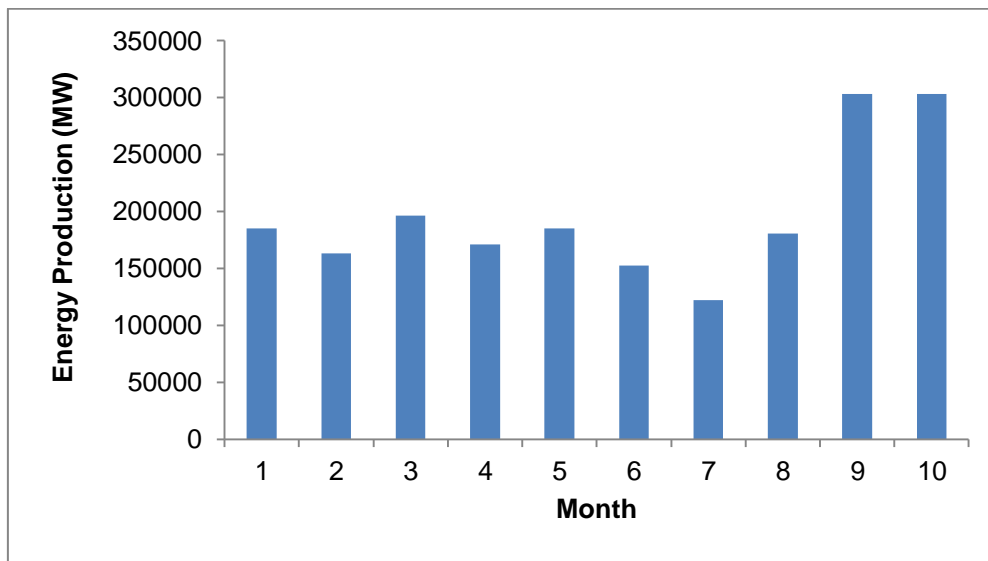
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**Figure 6: Total hourly energy production**

Two assumptions are made for the analysis:

- Considering the average capacity of the WPPs according to the RITM data (50MW for each, total 700MW of 14 sites) combined with the information given in Figure 5; we accept installed cost as \$2,000/kW (\$2 Million/MW)
- Considering the US Department of Energy report and the financial statements, we accept total O&M costs as \$23.5/MWh



**Figure 7: Total monthly energy production**

In order to conduct the economic study, annual worth (AW) method is used to evaluate the project. According to Blank and Tarquin (2012), the AW method is the most practical method to use for many financial decision making problems. Since the AW value is the equivalent uniform AW of all estimated revenues and disbursements during the life cycle of the project or alternative, it is easy to be understood by most individuals acquainted with annual amounts, *i.e.*, dollars per year.

Annual effective interest rate  $i$  is accepted as 8% per year. It is the opportunity cost of capital spent but not invested. Service life of the wind turbines  $n$  are accepted as 20 years with no

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salvage value. The analysis is conducted for different average values of the selling price  $p$  for MWh of electricity.

$$AW_{cost} = AW_{Installed\ cost} + Annual\ O\&M\ costs$$

$$AW_{cost} = 700\ MW * 2million\ \$/MW * (A/P, 8\%, 20) + 23.5\ \$/MWh * 700MWh * 24 * 365$$

$$AW_{cost} \simeq \$287\ million$$

$$AW_{revenue} = 275MWh * 24 * 365 * p$$

Where;

$$(A/P, i, n) = \frac{i(1+i)^n}{(1+i)^n - 1}$$

On the other hand, AW outcome is employed for the payback period analysis using the following equation:

$$AW\ of\ installed\ cost = Annual\ net\ cash\ flow$$

$$700\ MW * 2million\ \$/MW * (A/P, 8\%, n_p) = AW_{revenue} - 23.5\ \$/MWh * 700MWh * 24 * 365$$

Table 1 clearly shows that for any average selling price over \$120 per MWh, WPPs are economically viable with a discount rate of 8% per year and economic service life of 20 years. On the other hand, given that the average selling price of \$100 is not economically viable, there is no payback occurs at that selling price. The payback period decreases as the selling price increases.

**Table 1: AW and payback period at different selling prices**

Selling price (\$)	AW per year (\$)	Payback period $n_p$ (years)
$p = 100$	$AW_{revenue} \simeq \$241\ million$	No payback
$p = 120$	$AW_{revenue} \simeq \$289\ million$	20
$p = 125$	$AW_{revenue} \simeq \$301\ million$	17
$p = 150$	$AW_{revenue} \simeq \$361\ million$	10
$p = 175$	$AW_{revenue} \simeq \$422\ million$	7

## 4. CONCLUSION

Energy dependency and environmental impact of conventional energy resources drive Turkey to invest in renewable energy. Wind power proves to have a high potential all over Anatolian mainland and growing number of WPPs show that the investment in wind energy gains increasing attention. In accordance, this paper attempted to economically analyze the installed WPPs. Two analyses were conducted. AW analysis demonstrated that the plants are economically viable with a reasonable selling price and the system recovers itself within the service life plus the stated rate of return  $i$ , in this specific case.

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# **FACTORS INFLUENCING VOLUNTARY DISCLOSURE OF VIETNAMESE LISTED COMPANIES**

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**Abstract:** In late 2006 and early 2007, the Vietnamese stock market had developed dramatically but then plunged deeply without brake. One of factors was related to the transparency of listing companies. This study investigates factors influencing voluntary disclosure of Vietnamese listed companies based on corporate governance attributes, ownership structure and company characteristics. Using annual reports of 152 non-financial listed companies in Vietnam in 2007, the study finds that factors influencing the extent of voluntary disclosure of Vietnamese listed companies are internal audit committee, foreign ownership, institutional ownership, firm size and external auditor type. The state-owned attribute, one of the specialties of Vietnamese corporates, does not affect to voluntary disclosure along with non-executive, dual leadership structure, ownership concentration, leverage, profitability and liquidity characteristics. The result could be considered as a reference source for shareholders, managers, creditors, regulators and those who are concerned about upgrading quality of Vietnamese corporate annual reports to improve the market transparency to help investors make a good and timely decision basing on the accurate and up-to-date data sources.

**Keywords:** Voluntary Disclosure, Corporate Governance, Vietnam

## **1. INTRODUCTION**

### **1.1. Vietnamese stock exchange and information disclosure**

The stock market plays an important role in the development of the economy, especially in developing economies (Tessema, 2003). There is a strong and significant relationship between stock market development and economic growth. The stock market facilitates higher investments and the allocation of capital, and contributes to the economic growth. Investors sometimes avoid investing directly to the companies because they cannot easily withdraw their money whenever they want. But through the financial stock market, they can buy and sell stocks quickly with more independence (Boubakari and Jin, 2010). Vietnamese stock market had grand opening in the year of 2000. It has a crucial role of raising capital both from local and foreign investment to accelerate economic growth through debt and equity securities.

Berle and Means (1932) indicated that there was a separation between ownership and control along with the development of corporations. Shareholders are owners of the corporations but managers control them. Agency problems are occurred when the decision-making authority is delegated to managers. As business owners, shareholders must be aware of company operating status and require information for evaluation of managers' performance. Besides, the investors need more transparent information for their right investment decisions. However, corporate management is able to reduce the information disclosed to shareholders to conceal unbeneficial information. Corporate disclosure is critical



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for an efficient capital market. The demand for financial reporting and disclosure arises from information asymmetry and agency conflicts between managers and shareholders. The credibility of management disclosures is enhanced by regulators, standard setters, auditors and other capital market intermediaries. Companies, on the other hand, have incentives to disclose more information than requirements to reduce the firm's cost of external financing, reduce the likelihood of undervaluation and to explain poor earnings performance. Managers have incentives to make voluntary disclosures to correct any perceived undervaluation and the threat of shareholder litigation could also encourage managers disclose more information (Healy and Palepu, 2001). Corporate annual report is used as a communication channel between shareholders, potential investors, and regulators. Ministry of Finance, like many countries, regulated the mandatory information must be public including financial statements and annual reports. Addition to these requirements, Vietnamese listed companies also announced other voluntary information.

In research on the impact of voluntary information disclosure to the stock price, Haggard *et al.* (2008) demonstrated that voluntary disclosure has effect on stabilizing stock prices, maintaining corporate sustainability value and creating wealth for shareholders. With the prediction of voluntary disclosure reduces information acquisition cost and enhances firm transparency, Haggard *et al.* found that enhanced voluntary disclosure reduces stock price comovement. Cheynel (2013) in his paper proved that firms voluntarily disclose their information have a lower cost of capital than firms do not disclose. He also found that economies with a high disclosure friction feature overinvestment, while those with a low disclosure friction feature underinvestment. Voluntary disclosure is considered as an effective communication channel to interest-related parties and describing the corporate prospect. It is meaningful for listed companies' governance structure and enhancing the protection for investors' interests (Tian and Chen, 2009).

Vietnam's stock market is still young and is in the process of approaching international standards including disclosure requirements. Voluntary disclosure is believed to have positive impacts however little attention has been devoted to its role in the environment of Vietnam. This study empirically investigates the association between company characteristics and the extent of voluntary disclosure of Vietnamese listed companies.

### 1.2. Research objective

There is little evidence available on the extent to which Vietnam listed companies provides information over and above the requirement, and whether there are variations in the levels of such disclosure. This study would construct the voluntary disclosure index by using voluntary disclosure information in annual reports of Vietnamese corporates to determine the impact of corporate governance attributes, ownership structure and company characteristics to voluntary disclosure of Vietnamese listed companies.

## 2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW

### 2.1. Agency theory

Agency theory has been used in many researches in economics, accounting, marketing, finance, political science, organizational behavior and sociology (Eisenhardt, 1989). Agency theory models the relationship between the principal and the agent. Jensen and Meckling (1976) defined an agency relationship as "a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent". In the context of the firm, the agent (manager) acts on behalf of the principal (shareholder) (Eisenhardt, 1989; Jensen and Meckling, 1976).

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The principal has to use agent because he does not have enough ability to maximize value of his own property. The owner also use agent when he has resources restrictions. As part of this, the principal will delegate some decision-making authority to the agent and the welfare of the principal is affected by the choices of the agent. Therefore, the major issue is the information asymmetry between managers (agents) and shareholders (owners). In this relationship, insiders (managers) have an information advantage. The agent may take unobservability activities to enhance his personal goals (Eisenhardt, 1989; Jensen and Meckling, 1976). Owners therefore could not accurately evaluate and determine the value of decisions made by agents. The contracts between owners and agents therefore are written to address these conflicts. The costs for mitigation these agency problems as a result are huge. It is also possible that an agent may voluntarily provide information in order to reduce bonding costs and encourage outside investors to invest the company.

In this study, the voluntary disclosure is an opportunity to apply the agency theory, in which the managers have the advantage of access to private information of companies than shareholders and external investors. They, however, could generate reliable information to the market to enhance the value of the business by voluntary disclosure.

### 2.2. Corporate governance in Vietnam

In recent years, corporate governance has received increased attention because of scandals involving abuse of corporate power and, in several cases, alleged criminal activity by corporate officers. Corporate governance is a term that refers broadly to the rules, processes, or laws by which businesses are operated, regulated, and controlled. Good corporate governance should provide proper incentives for the board and management to pursue objectives that are in the interests of the company and its shareholders and should facilitate effective monitoring (OECD, 2004).

Many countries around the world have introduced corporate governance codes. One major aspect of these codes is the importance of accountability and transparency. Corporate governance is a mechanism to help companies achieve corporate goals and disclosure is an effective communication channel to investors about their performances. Many codes require listed firms prepare and submit annual reports including financial and non-financial information. Companies are encouraged to disclose more information than requirements.

In Vietnam, corporate governance principles have been applied recently and there are not many researches on this kind of topic are conducted. International organizations have important roles in recent years to help adopt and implement good corporate governance principles. The Organization for Economic Cooperation and Development, the World Bank, the International Finance Corporation, the U.S. Commerce and State Departments and numerous other organizations have been encouraging governments and firms in many countries to adopt and implement corporate codes of conduct and good corporate governance principles. The assessment of corporate governance in Vietnam conducted in May 2006 by the World Bank as part of the Reports on Observance of Standards and Codes Program (ROSC) showed that Vietnam has recently taken important steps to establish its corporate governance Framework. This report indicates some key issues of framework for corporate governance in Vietnam such as a high degree of informality still exists in the corporate sector, an unofficial securities market that is significantly larger than the formal market, and there remains a large presence of state ownership in enterprises (World Bank, 2006). Moreover, institutions responsible for regulation, enforcement, and development of the capital market have limited capacity and resources. It lead to some bad consequences, for example investor protection is inadequate, related-party transactions are pervasive, compliance with accounting standards is insufficient, and disclosures of quality information are limited (World Bank, 2006).

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## 2.3. Literature review and hypothesis development

Many countries around the world, especially in developed countries, have performed researches on voluntary disclosure. From 1970s, voluntary disclosure and its confirmation had taken as important research domain in finance (Li and Qui, 2008). This topic, however, is new and has no many works in practice of Vietnam.

Haniffa and Cooke (2002) studied the impact of culture and governance on corporate social reporting of Malaysian companies. In this study, Haniffa and Cook (2002) determined the relationship between governance characteristics, culture and level of voluntary disclosure in the annual reports of Malaysian corporates.

Barako *et al.* (2006) considered the impact of governance characteristics, ownership structures and corporate characteristics to level of voluntary disclosure. They found that factors of internal audit, non-executive directors, institutional ownership and foreign ownership as well as size and leverage have significantly affected to level of voluntary disclosure of Kenyan companies. Al-Shammari (2008), similarly, determined that size, leverage, audit and industrial type affects to voluntary disclosure in practice of Kuwait. In Turkey, Agca and Onder (2007) conducted a research on the impact of size, leverage, audit, ownership structure, profit and multinationality to voluntary disclosure and found that profit, size, leverage and audit had significantly impact to voluntary disclosure of Istanbul listed companies.

On different aspect, Akhtaruddin and Hossain (2008) found that there is a relationship between voluntary disclosure and concentration ownership on Board of Director in which ownership more concentrated in Board of Director, the less voluntary information disclosed. Nasir and Abdullah (2004) found the relationship between voluntary disclosure and the independent Board of Director, the external ownership and governance ownership but the same relationship could not be found between voluntary disclosure and internal audit committee.

There are also analysis of the methodology and the empirical measurement of voluntary disclosure of Abad *et al.* (2005); Director ownership and voluntary segment disclosure (Leung and Horwitz, 2004); Voluntary disclosure and stock price (Haggard *et al.* 2008); Board Structure, ownership and voluntary disclosure (Donnelly and Mulcahy, 2008).

This study examines the influence of corporate governance attributes, ownership structure and company characteristics on voluntary disclosure of Vietnamese listed companies. The selection of these elements based on study of Barako *et al.* (2006) and previous researches conducted both developed and developing countries. These elements had been proven have the influence on the level of voluntary disclosure of companies. The study, on the other hand, supplements a special characteristic of Vietnamese companies to the model with the State ownership attribute.

### 2.3.1. Corporate governance attributes

Board composition measures the number of non-executive directors to the total number of the whole board. Fama and Jensen (1983) argued that these members serve as a reliable mechanism to reduce agency conflict between managers and owners. They could be considered as supervisory members and enhance the board effectiveness (Franks *et al.* 2001).

Leung and Horwitz (2004) found that non-executive members of the board have a positive impact to the voluntary disclosure, especially in corporates that have low board ownership. Study of Donnelly and Mulcahy (2008) showed the similar result. Barako *et al.* (2006),

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however, found that non-executive directors have negative effect to voluntary disclosure of corporate. One explanation is that the presence of independent directors is a substitute for voluntary disclosure and another possible explanation is that outside directors may not be truly independent. Li and Qi (2008), Nasir and Abdullah (2004), Haniffa and Cooke (2002) found there is no relationship between the board composition and voluntary disclosure. The first hypothesis is constructing as following:

**H1:** The higher proportion of non-executive directors of the board has a positive impact to level of voluntary disclosure.

There is many discusses on corporate governance about the role of Chairman and CEO. In dual leadership structure, different people should hold Chairman and CEO while in unitary leadership structure Chairman is also CEO. Combining the two positions could bring a great power to CEO and reduce the monitoring function of the board (Fama and Jensen, 1983).

In studies of Barako *et al.* (2006), Nasir and Abdullah (2004) and Li and Qui (2008), the relationship between the levels of information voluntarily disclosed with dual leadership structure is unclear. Donnelly and Mucahy (2008) found weak relationship between dual leadership structure and the level of voluntary disclosure. In contrast, study of Haniffa and Cooke (2002) showed that dual leadership structure negatively affects the level of voluntary disclosure of corporate information.

**H2:** The dual leadership structure has a positive impact to level of voluntary disclosure.

Audit committee presence is associated with reliable financial reporting (McMullen, 1996). Internal Audit Committee, therefore, is mechanism to improve the quality of information flow between business owners and managers (Barako *et al.* 2006). The study of Nasir and Abdullah (2004), however, did not find the relationship between having internal audit committee and the level of voluntary disclosure of corporates.

**H3:** Internal Audit Committee has a positive impact to level of voluntary disclosure.

### 2.3.2. Ownership structure

Many different aspects have been conducted about the ownership structure such as ownership concentration, family ownership, government ownership, foreign ownership, institutional ownership and managerial ownership. This research would study four aspects of ownership structure including concentrated ownership, foreign ownership, institutional ownership and state ownership. These factors are selected based on previous studies. Besides, due to characteristics of Vietnamese stock market, information of other ownership to be difficult to retrieve, especially for family ownership.

As agency theory, agency conflicts are caused by separation between ownership and control (Jensen and Meckling, 1976). These conflicts could be more serious in corporates with dispersed ownership than concentrated (Fama and Jensen, 1983). In dispersed ownership companies, shareholders are lack of motivates and power to control over powerful managers. They could not be a formidable force to influence company's reporting practices (Barako *et al.* 2006).

Empirical evidences indicate that the relationship between ownership concentration and voluntary disclosure of information are complex. Using models listed companies in Kenya, Barako *et al.* (2006) have found negative relationship between ownership concentration and voluntary disclosure of information. The studies of Leung and Horwitz (2004), Nasir and Abdullah (2004), Li and Qui (2008), Haniffa and Cooke (2002) proved the opposite.

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Meanwhile, Al-Shammari (2008), Agca and Onder (2007) found no relationship between ownership concentration and the level of voluntary disclosure of corporates.

**H4:** The higher proportion of shares held by the top shareholders has a positive impact to extent of voluntary disclosure.

Haniffa and Cooke (2002) discovered a significant positive relationship between the proportion of foreign ownership and the extent of voluntary disclosure by Malaysian listed companies. Barako *et al.* (2006) argued that foreign shareholders consider disclosed information as a monitoring mechanism to managers. Arguably, foreign investors might affect to voluntary disclosure of Vietnamese corporates.

**H5:** The higher the percentage of shares held by foreigners has a positive impact to level of voluntary disclosure.

As large shareholders with dominant ownership, institutional investors have strong incentives to monitor corporate disclosure closely. Managers, on the other hand, could provide more voluntarily information to satisfy these large shareholders (Barako *et al.* 2006).

Barako *et al.* (2006), Haniffa and Cooke (2002), and Li and Qui (2008) found a positive association between the percentages of institutional ownership and the level of voluntary disclosure. In contrast, Donnelly and Mucahy (2008) found no relationship between the percentage ownership of institutional shareholders and the level of voluntary disclosure.

**H6:** The higher the percentage of shares held by institutional shareholders has a positive impact to level of voluntary disclosure.

Vietnam is a socialist country with a past associated with the wars. At present, Vietnam is a developing country with many socialist characteristics. Since the mid-1980s, through the renovation reform period, Vietnam has made a shift from a highly centralized planned economy to a socialist-oriented market economy. Before the renovation, the economy was heavily state-oriented. Although the equalization process started already in 1992, it took considerable time for it to take off. Vietnamese corporate governance can be described as an insider-based corporate governance system on the grounds of the dominance of state-owned enterprises (SOE) with privileges from the state, family-run companies (Bui and Chihiro, 2008). The SOEs are commonly recognized as lack of transparency as well as unprofessional board of commissioners (Kamal, 2010). The SOEs is generally believe do not provide more voluntary disclosure as others companies.

**H7:** State ownership has a negative impact to the extent of voluntary disclosure.

### 2.3.3. Company characteristics

The large companies with more resources have better conditions in the creation of comprehensive financial reports than the smaller counterparts as information generation and dissemination are costly (Buzby, 1974). Therefore, large enterprises could disclose more voluntary information in financial reports with intention to alleviate agency conflicts. The large companies, besides, operate in several business functions and generally require internal reports for overall organizational goal. These internal reports, after that, can become part of the information disclosed voluntarily by enterprises to provide shareholders, investors and the general public (Owusu-Ansah, 1998).

Barako *et al.* (2006), Al-Shammari (2008), Agca and Onder (2007), Leung and Horwitz (2004), Li and Qui (2008), Nasir and Abdullah (2004), Donnelly and Mucahy (2008) found positive relationship between the size and extent of voluntarily disclosed information.

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However Haniffa and Cooke (2002) found no association between the size of the enterprises and the level of voluntary disclosure.

**H8:** The larger firm has the positive impact to the extent of voluntary disclosure.

Jensen and Meckling (1976) argued that agency conflicts could be exacerbated by the presence of creditors in a firm's capital structure. In countries where financial institutions are primary sources for financial funds, they often require businesses with high leverages provide more information in the annual report. Furthermore, these firms tend to prepare detailed information for loans applications. In practice of Vietnam, banks are also primary sources of financial funds for corporates (Ahmed and Nicholls, 1994).

Barako *et al.* (2006) and Al-Shammari (2008) found positive relationship between financial leverage and the level of voluntary disclosure. However, Agca and Onder (2007), Leung and Horwitz (2004), and Li and Qui (2008), Haniffa and Cooke (2002), Nasir and Abdullah (2004) found no relationship between financial leverage and the level of voluntary disclosure of corporate information.

**H9:** The higher the leverage has a positive impact to the extent of voluntary disclosure.

Audit firms have a large effect on the decision to disclose information of corporates. Large audit firms regularly invest more to maintain their reputation as quality auditors (DeAngelo, 1981). Big audit firms likely to be less dependent on their clients, which may compromise the quality of their work (Owusu-Ansah, 1998). Independence of big audit companies makes them more influential on financial reports published by businesses to satisfy outside users (DeAngelo, 1981). The Big4 auditors include KPMG, Earnst and Young, PriceWaterHouseCoopers and Deloitte.

Barako *et al.* (2006) found no relationship between Big4 audited and the level of voluntary disclosure of information. In contrast, Al-Shammari (2008), Akhtaruddin and Hossain (2008), Agca and Onder (2007), Leung and Horwitz (2004) proved the opposite.

**H10:** Big4 audited has a positive impact to level of voluntary disclosure.

As agency theory, managers in advantage position to use internal information for their private goals (Eisenhardt, 1989). They could disclose more information as a means of justifying their positions and compensation packages (Singhvi and Desai, 1971). Unprofit corporates could hide information in order to disguise their weaknesses while large profit companies could provide more voluntarily information to improve their values. This, moreover, improve value of managers on the labor market (Barako *et al.* 2006).

The studies of Agca and Onder (2007), Haniffa and Cooke (2002) showed that profitability and voluntary disclosure of corporates are positively connected. Research results of Barako *et al.* (2006), Al-Shammari (2008), Li and Qui (2008), Nasir and Abdullah (2004) found no relationship between the level of profit and voluntary disclosure.

**H11:** The higher the profitability has a positive impact to the extent of voluntary disclosure

Institutions as well as investors and the creditors generally concern about the status of companies. They expect companies have the ability to pay for short-term obligations without having to sell the invested properties (Wallace and Naser, 1995). Arguably, companies with high liquidity tend to provide more information in comparison with low liquidity counterparts. Corporations with low liquidity would be less availability to conceal their illiquid status (Wallace and Naser, 1995).

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**H12:** The higher the liquidity has the positive impact to the extent of voluntary disclosure.

## 3. METHODOLOGY

### 3.1. Voluntary disclosure index construction

There are many studies with different voluntary disclosure index construction methodologies. Abad *et al.* (2005) have a statistic of methodologies to construct different voluntary disclosure index. This paper constructs voluntary disclosure index by using methodologies of Haniffa and Cooke (2002), Nasir and Abdullah (2004), Barako *et al.* (2006) and Donnelly and Mulcahy (2008).

Voluntary disclosure is the discretionary release of financial and non-financial information through annual reports over and above the mandatory requirements of regulatory. A list of items may be voluntarily disclosed by a company is constructed based on previous studies of Haniffa and Cooke (2002), Nasir and Abdullah (2004), Barako *et al.* (2006) and Donnelly and Mulcahy (2008) and consistent with the business environment of Vietnam. The main purpose is to examine the similarities between research and isolate the items has been consistently identified as relevant and may be disclosed by the company. This list then would be filtered to remove the mandatory information must be disclosed under provisions of the Securities Law and Enterprise Law as well as adjustments to remove RandD and MandA information, which could not be applied to all businesses. To ensure independence, the items removal is conducted through group discussions. The final list would be sent to experts as credit officers of commercial banks, who made the evaluation for corporate lending and auditors as well as professors to edit. The final list has 46 items including 4 categories of general and strategic information, financial data, forward looking disclosure and corporate social disclosure and board and senior management information as in table 1.

From annual reports of listed companies, with each item of information overlap with the list would eventually be recognized as 1 point. All annual reports would be carefully reviewed. The total score would be used for calculation of voluntary disclosure for every corporate ( $I_j$ ) as following:

$$I_j = \frac{\sum_{i=1}^N X_{ij}}{N}$$

$N$  is the total expected items of voluntary disclosure by company  $j$  ( $N=46$ ).  
 $X_{ij} = 1$  when company has information match with 1 item the final list and 0 vice versa.

### 3.2. Data collection

Research data come from 2007 annual reports of companies listed on HOSE and HNX. There are 105 companies on HOSE and 81 enterprises on HNX listed before 31/12/2006. In total 186 businesses there are 2 banks managed under Law of Credit Institutions and had different disclosure requirements should be eliminated. Other 32 companies, due to insufficient data for analysis should also be removed. The remaining 152 were taken into analysis. The year 2007 is chosen as it was the year before financial crisis of 2008. The financial crisis negatively affected to stock market and could affect to analysis. Besides, in 2006, stock market had developed dramatically but then plunged deeply without brake. 2007 is a suitable year to analyze reaction of companies after a strong growth phase.

In addition to annual report, information from HOSE, HNX, securities companies, securities depository center were also collected and compared to get final data.

**Table 1: Items in the voluntary disclosure categories**

General and strategic information	
1	Information relating to the general outlook of the economy
2	Company's mission statement
3	Brief history of the company (outside mandatory requirements)
4	Organizational structure/chart
5	Description of marketing networks and distribution channels
6	Company's current business strategy
7	Likely effect of business strategy on current performance
8	Market share analysis
9	Disclosure relating to competition in the industry
10	Media illustrations
Financial data	
11	Historical summary of financial data for the last 2 years or over
12	Statement concerning wealth created, e.g. value added statement
13	Supplementary inflation adjusted financial statement
14	Financial ratios more than mandatory
15	Leverage ratio
16	Graphic charts
17	Stock price history
18	Stock quantum history
Forward-looking information	
19	Business plans
20	Factors that may affect future performance
21	Likely effect of business strategy on future performance
22	New product/service development
23	Planned capital expenditure
24	Planned research and development expenditure
25	Planned advertising and publicity expenditure
26	Earnings per share forecast
27	Sales revenue forecast
28	Profit forecast
Social and board disclosure	
29	Number of employees for the last two or more years
30	Employees classification by genders
31	Employees classification by functions
32	Employees classification by levels
33	Reasons for change in employee number
34	Information about employee workplace safety
35	Recruitment policies
36	Training policies
37	Benefits information
38	Information on community involvement/participation
39	Environmental projects/activities undertaken
40	Pictures of directors
41	Age of directors
42	Academic and professional qualification of directors
43	Business experience of directors
44	Executive positions handling by directors
45	Positions of non-executive directors in other organizations.
46	Disclosure of minority shareholders.

**Source:** Haniffa and Cooke (2002), Nasir and Abdullah (2004), Barako *et al.* (2006) and Donnelly and Mulcahy (2008)



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## 3.3. Research model

Regression model was used to assess the level of voluntary disclosure of information. Correlation matrix between variables and variance inflation factor (VIF) were calculated to determine multicollinearity. This model based on studies of Haniffa and Cooke (2002), Nasir and Abdullah (2004), Barako *et al.* (2006) and Donnelly and Mulcahy (2008). All variables are listed in table 2.

Regression model:

$$I = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \beta_{11} X_{12i} + \varepsilon_i \quad (1)$$

I is voluntary disclosure index

$X_1$ - $X_{12}$  are independent variables with  $X_2$ ,  $X_3$ ,  $X_7$  and  $X_{10}$  are dummy variables.

i is observation

**Table 2: Independent variables**

Independent variables	Operational definition	Names
<b>Corporate governance attributes</b>		
Board composition	Ratio of non-executive directors to total number of directors on the Board	$X_1$
Dual leadership structure	Dummy variable. 1 is dual leadership and 0 is reversed.	$X_2$
Board audit committee	Dummy variable 1 is audit committee presented and 0 is reversed	$X_3$
<b>Ownership structure</b>		
Shareholder concentration	Percentage of shares owned by large shareholders who owned more than 5% to total number of shares issued	$X_4$
Foreign ownership	Percentage of shares owned by foreigners to total number of shares issued	$X_5$
Institutional ownership	Percentage of shares owned by institutional investors to total number of shares issued	$X_6$
State-owned dominance	Dummy variable 1 is state-owned for over 50% and 0 is reversed	$X_7$
<b>Firm characteristics</b>		
Size	Total assets	$X_8$
Leverage	Debt ratio defined as total debt to total assets	$X_9$
Big4 Audited	Big four vs. Non-Big four i.e. 1 for Big four, 0 otherwise	$X_{10}$
Profitability	Return on equity defined as net profit to total shareholders' funds	$X_{11}$
Liquidity	Current asset to current liabilities	$X_{12}$

## 4. RESULTS

### 4.1. Descriptive statistics

Data is retrieved from companies listed on the Ho Chi Minh Stock Exchange (HOSE) and the Stock Exchange Hanoi (HNX) before 31/12/2006 excluding financial institutions. As listed in Table 3, sample includes 152 listed companies, including 76 companies listed on HOSE

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(50%) and 76 enterprises listed on HNX (50%). The statistical results showed that the level of voluntary disclosure of 152 companies is 40.26%. The least voluntary disclosure is 4% and the most is 67% of the total 46 items. Skewness and Kurtosis and Kolmogorov Smirnov tests indicate the level of voluntary disclosure has a normal distribution.

**Table 3: Descriptive statistics of voluntary disclosure index**

Samples	152
Mean	0.4026
Standard Deviation	0.14151
Minimum	0.04
Maximum	0.67
Skewness	-0.085
S.E Skewness	0.197
Kurtosis	-0.546
S.E Kurtosis	-0.391
Kolmogorov-Smirnov	0.697
Asymp. Sig. (2-tailed)	0.716

Descriptive statistics for independent variables (Table 4) shows that approximate a haft of Board is non-executive members (49.39%). There is 35% in total companies has dual leadership structure while only 7% has internal audit committee. The concentration ownership is 39.1% means top shareholders own more than one third issued shares. The foreign investors own 13% of total shares for both individual and institutions. Institutional investors have more than 50% of companies' shares (including foreign and local institutions). Vietnamese companies have average assets at VND 497 billion and debt at 47% total assets. 11% of total 152 companies are audited by Big4. ROE of listed companies is 19% and liquidity is 2.4. 42% of total companies are state-owned.

**Table 4: Descriptive statistics of independent variables**

	Mean	Std. Deviation	N
Board composition	49.386	22.359	152
Board leadership structure	0.350	0.478	152
Board audit committee	0.070	0.260	152
Shareholder concentration	39.087	21.932	152
Foreign ownership	13.195	18.227	152
Institutional ownership	50.853	21.333	152
State ownership	0.420	0.495	152
Size	496,912,141,094	822,529,288,007	152
Leverage	47.683	22.322	152
Big4 Audited	0.110	0.308	152
Profitability	19.066	12.036	152
Liquidity	2.427	2.488	152

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## 4.2. Regression analysis and hypothesis testing

Regression results are described in Table 5 below

**Table 5: Regression estimates**

	Unstandardized Coefficients		Standardized Coefficients	t	P <sub>value</sub>	VIF
	B	Std. Error	Beta			
(Constant)	0.263	0.053		4.996	0	
Board composition	-0.00	0.000	-0.008	-0.126	0.9	1.179
Board leadership structure	0.021	0.021	0.072	1.033	0.303	1.265
Board audit committee	0.11	0.035	0.203	3.15*	0.002	1.083
Shareholder concentration	-0.001	0.001	-0.118	-1.446	0.151	1.74
Foreign ownership	0.002	0.001	0.242	2.94*	0.004	1.773
Institutional ownership	0.001	0.001	0.223	2.681*	0.008	1.811
State ownership	-0.027	0.024	-0.094	-1.111	0.269	1.89
Size	0.00	0.000	0.266	3.204*	0.002	1.8
Leverage	0.001	0.001	0.149	1.633	0.105	2.171
Big4 Audited	0.074	0.035	0.161	2.112*	0.036	1.528
Profitability	-0.001	0.001	-0.064	-0.954	0.342	1.182
Liquidity	0.004	0.005	0.066	0.754	0.452	1.982

**Notes:** R-square: 0.467, Adjusted R-square: 0.417, F=9.296, Sig.F= 0.000, N = 152, \* significant at 5%.

Ratio of non-executive directors to total number of directors on the Board does not affect to voluntary disclosure. This result is consistent with Li and Qui (2008), Nasir and Abdullah (2004), Haniffa and Cooke (2002). However, although no significant effect, the board composition has a negative impact on the level of voluntary disclosure. This could be members are not actually independent. Barako *et al.* (2006) showed that non-executive members negatively effects voluntary disclosure. In addition, the study result is not compatible with the findings of Leung and Horwitz (2004), Donnelly and Mulcahy (2008): Board members not directly involved in operating have a positive impact to the voluntary disclosure of the company. H1 is not supported.

The board leadership variable lacks statistical significance. The result is consistent with the findings of Barako *et al.* (2006), Nasir and Abdullah (2004), Li and Qui (2008), Donnelly and Mucahy (2008). Researchers found no relationship or only weak relationship between the level of voluntary disclosure and dual leadership structure. This result is different from the study of Haniffa and Cooke (2002), which showed that dual leadership structure negatively affect the level of voluntary disclosure of corporate. The chairman position might not be strong enough to have an impact on the decision of the Board and consequently could not able to affect the level of voluntary disclosure. The second hypothesis (H2) is not supported.

The presence of an internal audit committee is positively and strongly correlated to companies' voluntary disclosure. The finding is consistent with the findings of Barako *et al.* (2006). However, studies of Nasir and Abdullah (2004) did not find relationship between having internal audit division and the level of voluntary disclosure of corporate. Third hypothesis (H3) is strongly supported.

Although ownership concentration or percentage of shares owned by top shareholders negatively impact to voluntary disclosure of companies, the result does not have a statistical significance. The findings of Al-Shammari (2008), Agca and Onder (2007) also found no relationship between ownership concentration and the level of voluntary disclosure. Although not statistically significant, the concentration of ownership has a negative impact on the level of voluntary disclosure is evidence that the higher concentration ownership, the less

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voluntary disclosure. This could be due to the number of shares owned by the top shareholders so that they do not have to provide more information to the outside. Results of previous studies have difference as studies of Barako *et al.* (2006) find a negative signature while Leung and Horwitz (2004), Nasir and Abdullah (2004), Li and Qui (2008), Haniffa and Cooke (2002) found a positive relationship between ownership concentration and the level of voluntary disclosure companies. H4 is not acceptable.

The proportion of foreign ownership is found to be significant predictor of the extent of voluntary disclosure. With operational experience at development markets, where high demands information disclosure, foreign investors impact Vietnamese companies publishing more voluntary information. The finding is consistent with the findings of Barako *et al.* (2006), Haniffa and Cooke (2002). H5 is accepted.

The proportion of institutional ownership is found to be significant predictor of the level of voluntary disclosure. The research result confirms the assumption by owning stakes in hand, institutional investors have motivation to oversee the disclosure of information by businesses. Although Donnelly and Mucagy (2008) found no relationship, Barako *et al.* (2006), Haniffa and Cooke (2002), Li and Qui (2008) found a positive relationship between institutional ownership and the level of voluntary disclosure of corporate information. H6 is supported.

The SOEs are commonly recognized as lack of transparency as well as unprofessional board of commissioners therefore they are expected not to disclose more voluntary disclosure. However, the result shows that there is no relationship between state ownership and the extent of voluntary disclosure. The SOEs, in some cases, provide more voluntary disclosure than other counterparts. This could be an evidence to reject the argument that SOEs are not transparent. H7 is not supported.

The size of the business is measured by the total assets have a positive impact to the level of information voluntarily disclosed. The bigger companies announced more voluntary information. Results of Barako *et al.* (2006), Al-Shammari (2008), Agca and Onder (2007), Leung and Horwitz (2004), Li and Qui (2008), Nasir and Abdullah (2004), Donnelly and Mucagy (2008) are found positive connection between the size and extent of voluntarily disclosed information. Although many studies have found a link between the level of voluntary disclosure and the size of the business, Haniffa and Cooke (2002) did not find any valid links. H8 is accepted.

The research result shows that financial leverage of the company does not affect the level of voluntary disclosure. The assumption that the financial institutions often require companies with high debt in the balance sheet provide more information in the annual reports and these firms tend to prepare detailed information intended to borrow from financial institutions of Barako *et al.* (2006) and Al-Shammari (2008) could not be true in the case of Vietnam as the Vietnamese large banks do not use the annual report for valuation but they directly require companies provide necessary information. As a result, they do not affect the level of voluntary disclosure in the annual reports of companies. H9 is not supported. Although financial leverage does not impact the level of voluntary disclosure significantly, it has a minor positive impact to the voluntary disclosure. Firms with loans tend to provide more information than others. The findings are consistent with the results of Agca and Onder (2007), Leung and Horwitz (2004), Li and Qui (2008), Haniffa and Cooke (2002), Nasir and Abdullah (2004) - not found the relationship between financial leverage and the level of voluntary disclosure of corporate information.

The research also found that Big4 audited have a positive impact to the level of voluntary disclosure. These companies are audited by Big4 announced more voluntary information than firms without Big4 audited. This confirmed the independent audit affects the information disclosed. In this case, the large audit firms have more influence than smaller companies.

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Previous studies showed different results: Barako *et al.* (2006) did not find the relationship while Al-Shammari (2008), Akhtaruddin and Hossain (2008), Agca and Onder (2007), Leung and Horwitz (2004) found a positive relationship between the level of voluntary disclosure and independent audit types. H10 is supported.

Profitability has no impact to the level of voluntary information disclosed by listed companies. The finding is consistent with the findings of Barako *et al.* (2006), Al-Shammari (2008), Li and Qui (2008), Nasir and Abdullah (2004). They did find the relationship between profits and the level of voluntary disclosure of companies. However, Agca and Onder (2007), Haniffa and Cooke (2002) found profits and voluntary disclosure are positively correlated. In Vietnam, there is a signature that profits have a negative impact on the level of voluntary disclosure. This could due to businesses with better outcomes believe their profits have demonstrated the performance so that they do not need to provide further information. H11 is not acceptable.

Finally, the research result shows that the liquidity of companies does not affect the level of information voluntarily disclosed. Liquidity is measured by the ratio between current assets and current liabilities. Although no significant effect, the study also found a weak positive relationship between liquidity and the level of voluntary disclosure. In other words, companies with high liquidity tend to provide more information than low liquidity ones. Companies with low liquidity would be less availability to unveil their illiquid. The finding is consistent with the results of Barako *et al.* (2006) in which there is no relationship between the liquidity and the level of voluntary disclosure. H12 is not acceptable.

### 5. CONCLUSIONS

Research shows that the voluntary disclosure is diversified including general and strategic information, financial information and data, forward-looking information and social and board disclosure. The level of voluntary disclosure in annual reports is related to corporate governance attributes, ownership structure and firm characteristics. Corporate governance factor related to the level of voluntary disclosure is the internal audit committee. Percentage ownership of foreign and institutional shareholders is the ownership structure factor affecting the level of voluntary disclosure. The corporate characteristics' factors related to the level of voluntary disclosure are the size and type of the independent auditors. The findings contribute to the consolidation of agency theory and corporate governance practice with confirmation through factors affecting the voluntary disclosure of Vietnamese listed companies.

In the business aspect, the establishment of internal audit committee is within reach of the Board of Directors. In case corporate initiatives to improve the level of voluntary disclosure, the board could establish internal audit division. Investors and outside shareholders, on the other hand, could pressure to establish internal audit committee and then forcing company announced more voluntary information. Regulator could mandate internal audit committee is a requirement and regulate suitable mechanisms to ensure the operation and transparency of the internal audit committee.

The foreign shareholders could also affect the level of voluntary disclosure of corporates. Companies themselves could actively seek foreign partners. With experience at developed markets, foreign investors could provide a fresh and positive outlook about voluntary disclosure as well as appreciate companies adapting international standards of information disclosed including voluntary disclosure. Managers must understand that effective communication with the market is the way to mobilize financial resources with lower costs. Investors and shareholders could also require the Board to find foreign partners or issue shares to increase the percentage holding of foreign investors and in turn these foreign investors have pressures on companies to publish more information. The individual

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shareholders could also delegate to foreign investors to increase voice and force companies announced more information. Policy makers, moreover, could create more open mechanism for foreign ownership to attract foreign investors and indirectly force Vietnamese companies announce more information. The same situation could be applied for the institutional ownership.

Finally, the audit by the independent auditors, specifically the Big4, affects the level of voluntary disclosure of companies. With scale and long experience around the world, Big4 has prestigious influential independent role and influence to companies. Companies themselves also need to recognize that, to be audited by Big4 not only be required to published more information but also strengthen their reputation on the market. Investors and shareholders could have pressure on selection independent audit. The research results in many countries have demonstrated that Big4 audited increases the level of voluntary disclosure of corporates. The policy makers could encourage companies use services of reputational auditors.

This study has several limitations. Firstly, data source only focus on annual reports of companies. The other sources of information as press conference, the general shareholders meeting or the information provided on the website has not been taken into account. On a quick survey, companies with websites also provide more information than requirements. It is also a possible channel for voluntary disclosure study. Secondly, the data only focus on the year of 2007. Data of next years should also be included in the study to provide a more comprehensive assessment.

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# **RESEARCH ON THE EMERGENCE FORMATION MECHANISM OF LEAN CONSTRUCTION**

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**Abstract:** Emergence is the phenomenon, activity and process which create the new characteristics by the interaction of the elements of construction project system. Generally speaking, the emergence theory pays attention to the systematic evolution process from simplicity to complexity and from low level to high level. But the research result about emergence is not sufficient for lean construction. The lean construction endeavors to eliminate the system redundancy and pursue system optimization by applying the technology and method of reduction and subduction, and which plays an important role in the systematic evolution and emergence initiating of construction project. This also leads to the emergence of lean construction creates the new and different “quality” in the evolution of from complex to simple, from big to small and from more to less. This paper analyzed the limitations of existing theories, explored the theoretical basis of the emergence of lean construction from four aspects (duality theory, the development concept of dialectical materialism, biochemical view and organization view of economic society). Finally, the formation mechanism of the emergence of lean construction was discussed and verified. This paper tried to widen the emergence theory and its application to lean construction.

**Keywords:** Lean Construction, Emergence Theory, Lean Thinking, Complexity, System Science, Non-system

## **1. INTRODUCTION**

With the increasing of the dynamically changing environment of modern construction project, the management of construction projects is becoming more and more complex and difficult. The waste of time, resource, and communication in construction project still remains problem and the target cannot be met as expected. Therefore, people in the industry hope that there will be new management theories and methods which can be used in the project management.

Lean construction is a new construction management paradigm. Lean construction is to transplant the lean thinking into construction project field, and to inherit and develop it based on the features of construction project, which causes tremendous change of project delivery system, and in turn leads to the revolution of management concept, management theory and management technique. This also brings forward a challenge and an implication for traditional management.

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Although the high productivity lean construction brings attracts researchers and is introduced into construction industry, there are difficulties to apply some technologies, such as just-in-time, directly to the construction industry, and lean construction is still facing problem. This problem consists in the construction project is considered as a complex system since it has the features of technical innovation, accessibility, cooperation and competition among enterprises. In other words for this is that the lean construction is a giant and complicated self-organizing system with characteristic emergence (Bertelsen and Koskela, 2004; Bertelsen, 2004). As a complex system, the implementation process of lean construction is actually the whole emergence process of construction project. So, it is necessary to intensify research on emergence to improve the lean construction management processes.

Whole emergence is one of the most important concepts in the contemporary complex science. Ludwig Von Bertalanffy, the founder of emergence theory, believed that the whole emergence (referred as emergence), plays a very important role in system science, and the study on emergence phenomenon should be fundamental to system science (Fan, 2005). Santa Fe Institute (USA) (1997), which is famous for the study on complex, also listed emergence as the theme of its research. They believed that "Complex, indeed, is a science of emergence. The challenge that we are facing now is how to find out the fundamental rule of emergence". By now, Emergence has always been a subject of important in the theoretical circle and industry.

Complexity is a kind of space-time structure made up of interactive components or elements within the system, whose carrier is the complex system. After the formation of system by elements, some characteristics will emerge, which is liable to occur in the evolution of the system from lower to higher level, and could not be identified from any element of the system. This phenomenon is thus called emergence vividly. The reason why the system functions are "the whole is greater than the sum of parts" is due to the occurrence of the new characteristics of the system. The "greater" part is indeed the new characteristics emerged (Bertalanffy, 1987). This lead to emergence theory is usually applied for analyzing the evolution of the system from low to high level. The ideas of Holland, such as "Emergence---- more comes from less" and "Complex comes from simple", are the vivid description of the initiating process of emergence indeed. However, there are various trends of development in the objective things and the whole world. While the evolutionary trend from simple to complex exists, the collapsing trend from complex to simple also exists. After all, the world is made up of the two interactive trends (Pu, 1999). At the same time, the formation of complexity is not a sustainable add-up of complexity, but rather follows the cycling progress of simple----complex--- (re)simple---- (re)complex. The reason we pays attention to the emergence from complex to simple and from more to less, because the emergence is the inevitable link for the development of objects. Since the current theory pays little attention to this, the emergence theory is incomplete and limitation. This causes relative theory and method of lean construction are faultiness. So, this paper explores the formation mechanism of emergence by taking lean construction as example, which expects to make some contributions to the improvement of emergence theory and the uplift of lean thinking.

## 2. REVIEW OF RESEARCHES

### 2.1. The origin and central idea of the emergence theory for complex system

Since the 1950s, many scholars and certain research institution, such as Moorer, W. Ross. Ashby, Bertalanffy, Ervin. Laszlo, and "Santa Fe school" (SFI), had been researching on emergence in order to setup theoretical frame for emergence and abide by modern scientific standards. Scholars generally believe that systematic structure, and systematic environment and their relative relationship determine the system's wholeness and functions. It means that systematic wholeness and functions are the results of comprehensive integration of internal system and external systematic environment. According to emergence theory, emergency is

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not only a phenomenon, an activity procedure, but also a peculiar property of complex system. Some representative researches are as follows:

Moorer defined that the two compounds generated by the combination of causes, by the way of studying the combination of powers in physics and the combination phenomenon of hydrogen and oxygen in chemical reaction. And finally, he put forward the criterion for judgment of emergence's three aspects (Wei and Guo, 2010).

In the middle of the nineteenth century, British man, G. H. Lewes and W. Ross. Ashby, started their researches on emergence by studying the phenomenon of chemical synthesis reaction, and W. Ross. Ashby also analyzed the difference between emergence and generation, and put forward the idea that emergence is predictably by analyzing its components and structure.

Austria American biologist, Bertalanffy, introduced emergence into general system theory. He used Aristotle's proposition that is "whole greater than the parts" to explain emergence directly, namely,  $1+1>2$ . He believed "whole greater than the components", this means that the characteristics collected from isolated components are not equal to the combinational characteristics of the whole. As a result, the characteristics of complexes are newly-added and emerged comparing with its original elements. Bertalanffy was not only the first who introduced emergence concept to modern system science, but also clearly pointed out that the study on emergence phenomenon should be paid much attention to as an fundamental problem in system science. Bertalanffy's idea (1987) demonstrated the development direction of system science.

Ervin Laszlo (1985), American system philosopher, expounded that emergence created new qualities. And the qualities of the whole are not a simply qualities summing-up by its components. Based on an interdependent condition, each component makes up the whole and forms certain figurate structure for the whole, at the same time, initiates some new qualities which has overstepped the original qualities and the simple sum of theirs components during their mutual exchanges.

Santa Fe Institute (USA) was the first to study complexity according to emergence concept, and pointed out "three typical characteristics" of emergence. In the mid-90s for the 20th century, they clearly pointed out that the study on complexity is indeed a science of emergence... The core of the science is how to find out the fundamental principles of emergence (Waldrop, 1997)." Concerning the principle of emergence, John H. Holland (2001), scholar of Santa Fe Institute, believed that emergence is a complex question, which could not be explained by only a simply definition. According to his point of view, all these phenomena such as big coming from small, more coming from less, complex coming simple, mean emergence.

British Chinese, Ouyang (2002), pointed out that emergence refers to some alternations of objects, and it was not combinations people traditionally believe. She said: "Only the extra characteristics of the system were qualified to be treated as emergence." And resultant is different from emergence. The characteristics of resultant were connected with the material content of components mostly. The characteristics of emergence come from the organization of system components, and emergence function mostly belong on system structure level.

Recent years, the attentions of scholars at china and abroad, had moved on from studying the phenomenon of emergence to studying the mechanism of emergence. With the help of computer information technologies, the study filed of emergence had been enlarging, and the application researches in related fields are getting deeper and deeper.

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## 2.2. The limitation analysis of existing theories

1. The limitations of adduct regulations. Since emergence is a principle come from the study of complex system, many scholars such as Moorer, Lewes, Ashby and Bertalanffy all adopted the principle of “adduction” as “from small to big, from less to more, and from simple to complex”. They emphasized that the inter-functions of a variety of elements initiate emergence. The idea became the main theoretical basis of earlier studies of emergence. Following the development of emergence study, scholars found out that the theoretical basis was clearly limited when explaining the causes of emergence because the complexity is not the inevitable pursuit of system. During the process from disorder to order, the development of complex system will experience a process of element-reducing, element-reorganizing, and element-decomposing. This process is corresponded with the evolution process of “from simple to complex”. It is a kind of transformation from more to less, from big to small and from complex to simple. As a result, extra system characteristics are initiated. Namely, there are not only “adduction” can initiate emergence, but also “reduction” and “subduction” can initiate emergence.

2. System hypothesis of emergence. From the sum-up above, a hypothesis premise, that is to say the system hypothesis could be found collectively in earlier research. And systematicness means non-adduction character and nonlinearity. Systematic hypothesis paid attention to the heterogeneity of system elements. It emphasized that only those objects, which could initiate emergence, could be called system. Abiding with this strict hypothesis, emergence theory always paid attention to the systematic evolution process from low to high, from simple to complex etc. Nevertheless, there exists energy exchange with outside environment during the whole system evolution process. The condition of system is not unchangeable. Under some circumstance, a stable system condition did exist. Bertalanffy defined system science as a science on whole or wholeness, which gained wide public acceptance. However, he still believed the definition was too ambiguous; then, he farther divided system in two kinds of molds. Mold one has whole additive property. This mold is the sum up of all the isolated elements, namely non-system without emergence property. Mold two has whole non-additive property, that is to say system. The identical elements can show different property when it is inside or outside the system (Wei and Guo, 2010). Bertalanffy's point of view emphasized that system itself could initiate emergence. But he did not emphasize the whole which can initiate the emergence is the system. The whole which can initiate emergence or not is not the key point to define it is a system or not. Research on emergence should pay much attention to the transformation from non-systematic whole to systematic whole. In the transformation, the subduction of repetitive elements and the definition of non-systematic elements are essential to finish this process.

3. Causes of the limitations of existing theories. Since the study on emergence was initiated by the study on complexity, it mainly paid attention to its static characteristics, namely, the performance status of emergence and the relationships among different levels of complex system at the initial period. The research purpose of this period was emergence recognition and found out the characteristics of emergence and its elements. The study was mainly on the cognition issue. At this time, it was unnecessary to explain the emergence phenomenon in the process from complex to simple. Following the penetration, step by step, the emergence study's attention changed from “static state” to “dynamic state”. And the research was focused on dynamic mechanisms, such as “How did emergence initiate”, “the causes of emergence”, “and “the route of emergence”. At this time, the original basic theoretical study could no longer be enough to explain everything because there are a lot of emergence phenomena in the transformation from complex system to simple system. For example, in the organ functions degradation during the process of biological evolution, in the decomposition and cracking of chemical reaction, in the transformation process of disintegrating, reducing, and reorganizing of social organization. In order to setup a complete emergence theory, all these should be considered and included in the study. And only then,

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the study, on how to find out better methods to explore the development route of complex objects, and on how to control the forward and backward emergence in development based on the understanding of the formation of complex objects and the changing laws would be able to achieve.

### 3. THE INTEGRATION ANALYSIS ON EMERGENCE THEORY AND LEAN CONSTRUCTION

#### 3.1. The characteristics of systematic emergence

The British emergentism school summarized four characteristics of emergence from the angle of philosophy. Firstly, emergence is a new property only in the high level; secondly, emergence has a characteristic of unpredictable novelty; thirdly, emergence is characterized by irreducibility among different levels; fourthly, emergence is characterized by causal relationships between the high-level and the low level (Fan and Zhang, 2005).

Scholars from Santa Fe Institute put forward that emergence at least has the following characteristics: 1. Universality. From inanimate society to life world, from nature world to human society, from social activities to mental activities, emergence can be found everywhere. 2. Systematicness. Objects having emergence phenomenon are not only made up of a lot of components, but also is the result of the interaction of these components. It is a kind of systematic phenomenon with systematic characteristic. 3. Novelty. Unpredictability and beyond one's range of expectation are the important characteristics of emergence.

Mr. Moorer proposed three criterions about emergence, which helps us understand the characteristics of emergence: Firstly, the emergence characteristics as whole are not the sum of the characteristics of its each parts; secondly, the types of emergence's characteristics are far different from the types of components'; thirdly, the characteristics of emergence cannot be deduced or forecasted by observing the components' activities alone.

#### 3.2. The emergence of lean construction

The core thought of lean is to eliminate waste, improve speed and mobility. The essential aim of lean is to eliminate the wastes of every segment. Lean construction has put lean thinking used widely in the manufacture into construction project management, and made a lean management from a perspective of the entire life cycle. Its essence is to eliminate the waste and maximize the construction project value.

According to the theory of lean construction, we know there are many flow processes of the resource and information in the project, these flows are mostly non-transformed(non-value-added) activities, in order to eliminate waste and improve project efficiency, it is necessary to optimize the non-transformed activities. The traditional construction model is only concerned about the optimal management of the conversion(value added) activities, but they ignore the hidden material flow between the non-transformed(non-value-added) activities, such as information sharing, resources waiting and delivery of activities; and the fact that the flow of these substances is often the main reason for the project schedule delay.

With the lean construction theory developing and improving consistently, lean construction has great impact on construction project management. For example, the Last Planner System, as an important tool in lean construction, has been improving the project schedule, quality and cost greatly. For another example, the rapid development of building information modeling(BIM) has brought about a gigantic revolution in construction industries. With BIM technology, an accurate virtual mode is constructed digitally, which contains precise geometry and relevant data needed to support the design, construction, fabrication and procurement activities through the project's whole life cycle. When properly implemented, the BIM users can gain a range of benefits that include improved productivity, enhanced quality,

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saved cost, shortened construction period and etc. In brief, lean construction has greatly changed the traditional construction industry.

The emergence of lean construction refers to the emergence generated by lean construction. The emergence of lean construction is different from the traditional “adduct” thought of emergence. It abides by “reduction” thought. Namely, the thought pays attention to the change of environmental elements and keeps eliminating redundancies in the elements of the system in order to achieve sustainable excellence and stable operation on the basis of identifying the values correctly. In other words, the thought is to keep the system on forward emergence development by achieving “ $N-1 > N$ ,  $N-M > N$ ”. As a matter of fact, the thought is suitable for every type of lean management system.

### 3.3. The theoretical basis of the emergence of lean construction

1. Duality Theory. According to duality theory, all systems in objective world have two sides, they are both opposite and unified with each other simultaneously, namely duality structure. In the structure, the two sides intermingle with each other, rise and fall mutually, and perfectly complement each other. In the whole process, antagonism generates motivation for the system to achieve development; conformity generates stability for the system to keep developing (Xu and Gao, 2005). According to this theory, there are systematic emergence from simple to complex, and also system emergence from complex to simple in objective world. The emergencies can be two systems with duality, and can also be two sides of one system. As a result, adduct can generate emergence, and its counterpart of duality----such as subduction of lean construction can also generates emergence.

2. The development concept of dialectical materialism. The systematic and non-systematic overall concept, proposed by Mr. Bertalanffy, is to classify systems in order to give a better explanation to the generation of emergence. In other words, Non-systems do not have emergence. According to dialectics theory, all objects keep changing all the time. System and non-system are relative and transform each other. In reality, systems in all fields, such as in social field, in economic field and in biological field, is keeping change from time to time. From this point of view, systematic hypothesis of emergence shall be based on a kind of ideal condition. In most cases, the problem which people have to deal mostly is how to identify the value of systematic elements, how to eliminate worthless elements (elements with negative value) from systems, and how to realize the organism combination of elements, and so on. Generally speaking, the whole of non-systematicness and the redundancy phenomenon in the whole of systematicness are constant states. Lean construction takes advantage of lean thinking for system optimization, eliminating negative factors, keeping positive factors, and creating conditions for the realization of emergence. Namely, the subtraction principle of lean construction can also initiate emergence.

3. Biochemical view. In biological evolution process, it has a common principle that single-celled organism evolves into multi-celled organism. Namely, it is an evolution principle from simple to complex. And at the same time, a phenomenon of degenerating exists also. This kind of degeneration is still a kind of emergence, which is good for the organisms to suit their outside environments. Mr. Moorer used chemical reaction as an example to explain that there is a kind of heterogeneous relationship between the result of the main cause and the sub-causes. The chemical compound properties consisted of two elements was named generation or emergence (Wei and Guo, 2010). Along Mr. Moorer’s train of thought, in the chemical reaction process, so-called decomposition and pyrolysis is to decompose complex chemical material into simple chemical material. Anyhow, new material coming into being is its final result, which shows characteristics of emergence.

4. Organization view of economic society. In economic and social system, phenomenon such as factor recombination, reduction and so on always exist. Big system divides into small

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systems, complex system divides into simple systems. For the primary systems, elements reduced, new organizations with exuberant vitality come into being. According to the characteristics of emergence, these phenomena can be called emergence.

### 4. THE FORMATION MECHANISM ANALYSIS OF THE EMERGENCE OF LEAN CONSTRUCTION

The lean construction may be considered as a very complicated and self-adaptive system in the system science, the inter-reactions and dependency relationships among the inner participants and with the outside environment make up the overall situation of lean construction. In the process of lean construction implementation, each participant improves its outside development environment by communicating with the other related participant, and also benefits from this kind of communications. New efficiency and effectiveness emerges, caused by the inter-reactions among the participants based on the win-win idea. The achievement of this kind of efficiency and effectiveness gets far more benefit than the inter-reactions among independent participants. The emergence mechanism of lean construction shows the trends of the integrating, which mainly reflects from the following three aspects: 1.The emergence feature of lean construction is not a simple addition, which can achieve a result as  $1+1>2$ ; 2.The types of lean construction's feature is far different from the feature of traditional construction project management practices. The combination of contributions of lean construction participants based on the value flow generates new values; 3.The feature of emergence cannot be derived from simply observing a certain participant's activities. It is the result of combined actions of all the elements within the lean construction system. The basic theories of lean construction about emergence can be expounded as follows:

#### 4.1. The core of lean construction emergent properties -value flow

The self organization is divided in two kinds of structures by Mr. Prigogine as equilibrium structure and dissipative structure. Equilibrium structure is an ordered structure, which is created by the phase transition during equilibrium. Dissipative structure is an ordered structure, which is created by the phase transition when the system is under a condition of far from equilibrium. Keeping its own structure without exchanging with outside environment is the basic characteristics of equilibrium structure. And only by keeping exchanging materials, energies and information with outside environment can the dissipative structure keep its ordered structure. Obviously, lean construction structure is a kind of dissipative structure, because it is an open system far from equilibrium with typical nonlinear character. Abiding by the core proposition as "non-balance is the source of order", during the process from disorder to order, each building process' value need be correctly defined and its value flow need be identified and the elements which can influence the value and the value flow's running need be eliminated in order to keep a high efficient running of value flow. Construction project is a complex system which keeps exchanging energies with outside environment. This makes the dynamic interactions exist among the elements inside the system. Lean construction provides basic conditions for forward emergence by paying attention to the value coming from consumers and prompts the result of dynamic interactions to achieve forward development during system evolution.

#### 4.2. The foundation of lean construction emergent properties --- eliminating redundancy

The one of aim of system optimization is seeking emergence. Namely, the interaction of system elements may conduct new functions. In term of lean construction system, treating construction project as a communication link, the planning and implementation of lean construction can unite resources belonged to different participants and establish a quick reaction chain concerning the whole process from raw materials, accessories, prefabricated parts to building, it also includes all the flows as logistics flow, information flow and monetary flow. Only in this way can the quick responding capability towards outside customer

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demands emerge. During actual implementation process, the construction of high-efficiency system is the most difficult. All elements, such as waste of waiting time, bloated organization, overmuch suppliers, waste of transportation etc. may become the obstruct blocking the construction of a high-efficient system. However, the whole emergence could realize by implementing lean construction, this includes: paying close attention to customer value, getting rid of inventory redundancies, organization redundancies and non-value-added processes.

The implementation of lean construction is the basis of whole emergence of construction project. Emergence cannot be realized without solid foundation. For construction project system, a certain optimum models which can realize emergence do exist theoretically. Namely, the optimum allocation condition of the elements concerning the organization and structure of lean construction can be achieved under certain external conditions. But in reality, there is not a shortcut towards achieving the optimum model. Standing on solid ground and abiding with lean construction principle, sustainable excellence and stable operation will only happen, and only in this way could the quantitative change to qualitative change be achieved.

### **4.3. The source of lean construction emergent properties ——the lean improvement impetus**

Whole system emergence comes from three aspects: component, structure and environment. And material effect, scale effect, structural effect and environment effect jointly achieve the whole system emergence (Miao, 2006). After a fierce competition, some construction enterprises still keep their stable and booming development momentums. The reason for these enterprises to achieve successes is that they chose a far different way to fight back. They realize that the world has changed fundamentally. Uncertainties and crises are no longer treated as exceptions, but regular patterns. So, according to their correct assume, they abandoned traditional management models, employed lean principle and method to construction projects, established their own lean motivation mechanism. They defined the customer demands as the purpose, paid attention to their fluctuation, combated dynamic with stable workflow, afterwards forced the interaction results of lean construction elements on a positive emergence. Lean motivation mechanism can be summarized into five aspects: taking precautions, rising tide management, creating dynamic equilibrium, eliminating the emergency culture and maintaining a competitive edge (Ruffa, 2010). By coping with environmental effects as a breakthrough point, the practices of the five aspects bring material effect, scale effect and structure effect into lean construction process. As a result, performance of lean construction keeps sustainable emergence.

## **5. THE CONTRIBUTION OF THIS PAPER**

### **5.1. The contribution to lean thinking**

Although a lot of scholars practiced many studies on lean, lean theory was still incomplete, lean was treated as application tools only. And the studies were still focused on the application field. Lean theory and system science were paid less attention to this. As a result, the spread and development of lean thinking and lean theory were limited. Based on the analysis on lean theory and systematic emergence mechanism, this paper developed the emergence theory of lean construction and probed into its emergence mechanism, perfected the relative theory and method of lean construction. Meanwhile, this paper developed the lean thinking, deemed that lean is an inseparable project of system science, and shares same study target with system science. In fact, the aim of lean construction, lean management and lean operation are all having emergence too. So, paper not only promoted the study on lean construction theory, but also merged lean with system science as a whole and promoted the theory level of lean.



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## 5.2. The contribution to emergence theory

The core thought of lean construction emergent properties is that lean can promote system to initiate emergence. The theory is based on the idea that system elements and their interactions keep changing from time to time. In the development process from disorder to order, the principle of reduction is indispensable, which made up the shortage of traditional emergence adduction theory basis and explained properly the phenomenon such as systematic organization evolution and the disintegration and re-organization of non-systematic organization and also enlarged emergence theory's field of application.

This paper pointed out the shortcomings of the traditional theory, namely, the objects which has whole emergence can be treated as system because the idea is not fitted to Bertalanffy's point of view. Bertalanffy showed clearly that studying emergence phenomenon was the essential practice for studying system science, but traditional view confused cause and effect and simplified the system emergence phenomenon. As an example, we were notified that the fish (target) we demanded is in some pools. And then we were asked to pay attention to the pool. In reality, the relation is not simple between system target and system element. The environmental changes and disorderly changes among elements all could force system far away from target. The emergence of lean construction is put forward based on dynamic change as the background, and put both systematic whole and non-systematic whole together. These ideas keep completing system emergence theory and give theoretical support for solving the difficult problems as system construction and optimization, and so on, which are existed commonly in real lives. Furthermore, according to system emergence theory, the emergence of lean construction gives expression to an ascending and spiraling dialectical materialism philosophy.

## 5.3. The contribution to lean construction theory

Lean construction takes work flow and work flow continuity to be research object and focuses on how to ensure work flow continuity under variability of task duration and how to decrease the waste during the flow process of work flows. But in reality there are only a few enterprises could achieve real operation and management in this way worldwide, and this is because most enterprises did not have the capability to put into effect. Most enterprises could carry out "adduction" in form, but could not implement lean construction properly. As a result, the emergence of lean construction was difficult to initiate in most companies' operations. For construction enterprises, there are more reduction and subduction emergences than adductive emergences in real life. For this point of view, the emergence theory of lean construction will play a role in the development and practices of construction projects management theory.

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# ANALYSIS OF INFLUENCING FACTORS OF GCS' BEHAVIOR BASED ON STEPWISE REGRESSION\*

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**Abstract:** GCs which is short for Green Consumers have direct influence on the sustainable development of green consumption. This paper intends to study on GCs' behavior by analyzing GCs' psychology with stepwise regression method in order to find out important influencing factors of GCs' behavior and relationships between those factors and green consumption.

**Keywords:** GCs' Behavior, GCs' Psychology, Influencing Factors, Stepwise Regression

## 1. INTRODUCTION

Improving environmental performance through businesses and consumers called Greening Business is of global concern in recent times. Green consumption refers to the consumption that makes use of the natural resources effectively and fully, or the consumption that does no harm to the environment and causes the smallest pollution or even none.

Peattie (2010) considers that developing more sustainable consumption system depends upon consumers' willingness to engage in "greener" consumption behaviors. As the main part of market, Green Consumers (GCs) play a decisive role in the development of green consumption. At the meantime, the psychology of GCs can largely influence their behaviors. Many factors contribute to every change of GCs' psychology. Therefore, it is of great importance to study GCs' behavior through working on the factors influencing their psychology.

## 2. INDICATOR DESIGN AND INVESTIGATION ON FACTORS INFLUENCING GCS' PSYCHOLOGY

### 2.1. Indicator design

GCs are those who seek to fulfill economic responsibility with their choices of environment-friendly products. Lee *et al.* (2013) find that the activations in the frontal area may potentially be a unique neural indicator of GCs' cognitive engagement with environment-friendly product

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messages. Li *et al.* (2013) consider that the impact of environmental awareness on GCs' purchasing behavior is mediated by green perceived value, containing healthy value, emotional value, image value and environmental value.

Consumers' mental process directly determines whether consumers are carrying out green consumption or not. As a complex social and psychological phenomenon, consumers' psychology is inevitably affected by external environment. Therefore, the indicators can be shown like:

- *Impact of economic environment factors.* Economic development level, industrial structure adjustment, the degree of opening, price level and uncertain factors in economic operation, such as urban and rural employment contradictions, structural unemployment, imperfect social security system, consumption policy and order all can have an effect on GCs' psychology. In general, the level of economic development restricts the change of consumer's psychology.
- *Impact of social culture factors.* In the consumers' psychology science, social culture refers to the customs, values, behaviors, attitudes, lifestyles, ethics, beliefs, aesthetics and so on. They are formed and passed down in the process of social development.
- *Impact of social group factors.* Family, as a special social group, influences consumers' values and habits imperceptibly. In addition, Social class factors and relevant group factors can also have certain influence. People from different social class have different consumption propensity, targets, products and quality requirements, as well as choices for consumption patterns, information and the ways of transmission. Relevant groups' influences are mainly showed as group pressures and mental compliance.
- *Impact of consumption custom and popularity factors.* Consumption custom refers to the consumption habits that people from different regions develop in their daily life, which usually makes consumers' psychology tend to be stable as they reinforce consumer preferences. Consumption Popularity is a kind of consumption pattern that is fashionable during a certain period. It affects the consumption cognitive attitude, driving force and response, as well as the changes of the consumption habits and preferences.

Study has also found whether consumers can become green and how far they can go along have a connection with their age, gender, educational level and social status. The concept of green consumption is more easily accepted by those who are open-minded, self-confident, willing to accept new things, with high level of education. So, teachers, educators, university students and white-collar workers are most likely to become GCs.

### 2.2. Preparation of the questionnaire

In the questionnaire, 30 questions related to the influencing factors are regarded as predictor variables. 3 questions related to consumers' willingness of green consumption are regarded as dependent variables, namely  $A_1$ ,  $A_2$  and  $A_3$ . "Environment friendly products are my first choice for shopping" ( $A_1$ ), "In the process of consumption, I pay more attention on green consumption" ( $A_2$ ), and "I am willing to fight against acts of harming consumers' health and damaging the environment" ( $A_3$ ). These 3 questions separately describe different aspects that consumers treat green consumption:  $A_1$  shows consumers' concerns;  $A_2$  shows consumers' behaviors in the process;  $A_3$  shows consumers' responsibility.

To hide the purpose of the survey from the respondents and get the real information to the most, there are 33 questions in the questionnaire (3 dependent variables are scattered in the 30 predictor variables). Both of the predictor variables and dependent variables are measured by Likert Scale of six levels, from "1-completely disagree", "2-relatively disagree", "3-a little disagree" to "4-a little disagree", "5-relatively agree", "6-completely agree".

### 2.3. Investigation

Apparently, this study is mainly oriented to teachers, educators, university students and white-collar workers because such concept is more easily accepted by these groups. With 60 people pre-tested, main factors were preliminary extracted and every question in the questionnaire was tested to ensure the reliability and validity of the questionnaire. After the pilot study, investigation involved in 360 people was conducted.

The final questionnaire was used to test 360 respondents and 341 were returned. The returning rate is 94.72%; after selection, 339 are valid, accounting for 99.41% of the returning questionnaires, 94.17% of the total questionnaires.

### 2.4. Extraction of the influencing factors

According to the principle of “the simplest form” shown in Bartlett (1950) and Abdi and Williams (2010), there are 6 main factors can be extracted in Table1.

Table 1 shows that the cumulative contribution rate of the six factors is up to 58.704%. It means that the reliability of the 30 questions can be well reflected by 6 factors. Table 2 shows eigenvectors of these six factors.

**Table 1: Final statistics of the factors (n = 360)**

Factors	Eigen Values	Contribution Rate (%)	Cumulative Contribution Rate (%)
$X_1$	4.683013	15.61004	15.61004
$X_2$	3.468704	11.56025	27.17029
$X_3$	2.870938	9.569793	36.74008
$X_4$	2.671727	8.905758	45.64584
$X_5$	2.084698	6.948994	52.59483
$X_6$	1.833963	6.11321	58.70804

The 6 factors can be named as followed:

- “Consumption order ( $X_1$ )” reflects the phenomenon that legitimate rights and interests of the consumers cannot get well safeguarded under chaotic market order.
- “Social culture ( $X_2$ )” shows cultural impact on consumption.
- “Social group ( $X_3$ )” indicates mutual effect in the consumption process.
- “Economic level ( $X_4$ )” reveals consumers’ satisfaction with present material life, dependence on spiritual life and concern for health and environment.
- “Consumption habit ( $X_5$ )” mainly shows consumers’ traditional habits.
- “Consumption popularity ( $X_6$ )” mainly describes consumers’ concern for popular products.

**Table 2: Eigenvectors of six factors in Rotated Component Matrix (n=360)**

Eigenvectors	Components					
	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$
8	0.67102					
11	0.800033					
12	0.706185					
18	0.620897					
21	0.83697					
25	0.740228					
9		0.673475				
13		0.46096				
19		0.553089				
20		0.373644				
22		0.545282				
23		0.759756				
33		0.564611				
5			0.507185			
6			0.772572			
7			0.692815			
17			0.472742			
24			-0.56346			
1				0.688545		
2				0.755611		
3				0.654221		
16				0.677241		
10					0.668774	
26					0.680432	
28					0.454388	
29					0.804219	
14						0.589385
30						0.561299
31						0.700162
32						0.75025

### 3. ANALYSIS OF FACTORS INFLUENCING GCs' PSYCHOLOGY

Green (1991) shows the opinion that stepwise regression keeps important variables in the final regression equation by electing or removing those less significant variables. In this paper, stepwise regression analysis will be conducted to identify major factors which influence GCs' psychology and determine the relationship between GCs' behaviors and green consumption.

#### 3.1. Regression analysis results of $X_1 \sim X_6$ with $A_1$

Table 3 represents that multiple stepwise regression for  $A_1$  can be divided into two steps. The first is to introduce independent variable " $X_2$ -Social culture"; the second is to introduce " $X_4$ -Economic level".

**Table 3: Input / remove variables**

Model	Variables Entered	Variables Removed	Method
1	$X_2$ : Social culture	0	Stepwise(Criteria:Probability-of-F-to-enter $\leq$ 0.050,Probability-of-F-to-remove $\leq$ 0.100)
2	$X_4$ : Economic level	0	Stepwise(Criteria:Probability-of-F-to-enter $\leq$ 0.050,Probability-of-F-to-remove $\leq$ 0.100)

**Dependent Variable:** Environment friendly products are my first choice for shopping ( $A_1$ ).

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Table 4 indicates that multiple stepwise regression for  $A_1$  can be done by two steps. The first is to introduce the independent variable " $X_2$ -Social culture", with R Square value of 0.299; The second is to introduce the independent variable " $X_2$ -social culture" and " $X_4$ -Economic level", with R Square value of 0.396.

**Table 4: Model summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.547(a)	0.299	0.274	1.27732
2	0.629(b)	0.396	0.351	1.20749

Predictors: (Constant), social culture

Predictors: (Constant), social culture, economic level

Table 5 indicates the two steps of multiple stepwise regression. The first is to introduce the independent variable " $X_2$ -Social culture", with SS regression=19.517, MS regression=19.517; SS residuals=45.683, MS residual=1.632;  $F=MS \text{ regression}/MS \text{ residuals}=11.962$ , and  $P=0.002$ . The second is to introduce the independent variables " $X_2$ -Social culture" and " $X_4$ -Economic level", with SS regression=25.833, MS regression=12.917; SS residuals=39.367, MS residual=1.458;  $F=MS \text{ regression} / MS \text{ residuals}=8.859$ , and  $P=0.001$ .

**Table 5: ANOVA(C)**

Model	Sum of Squares	Mean Square	F	Sig.
1 Regression	19.517	19.517	11.962	0.002(a)
Residual	45.683	1.632		
Total	65.200			
2 Regression	25.833	12.917	8.859	0.001(b)
Residual	39.367	1.458		
Total	65.200			

Predictors: (Constant), social culture

Predictors: (Constant), social culture, economic level

Dependent Variable: Environment friendly products are my first choice for shopping ( $A_1$ ).

Table 6 indicates the two steps of multiple stepwise regression. The first is to introduce the independent variable " $X_2$ -Social culture". Coefficient of variable " $X_2$ -Social culture" is 1.016 and standardized coefficient is 0.294,  $P=0.002$ ; Constant coefficient is 0.943,  $P=0.392$ ; The second is to introduce the independent variables " $X_2$ -social culture" and " $X_4$ -Economic level". Coefficient of variable " $X_2$ -Social culture" is 1.093 and standardized coefficient is 0.588,  $P=0.001$ ; Coefficient of variable " $X_4$ -Economic level" is 0.526 and standardized coefficient is 0.314,  $P=0.047$ .

**Table 6: Coefficient  $A_1$**

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
	<i>B</i>	<i>Beta</i>		
1 (Constant)	0.943		0.870	0.392
$X_2$ : Social culture	1.016	0.547	3.459	0.002
2 (Constant)	-0.847		-0.634	0.532
$X_2$ : Social culture	1.093	0.588	3.901	0.001
$X_4$ : Economic level	0.526	0.314	2.081	0.047

**Dependent Variable:** Environment friendly products are my first choice for shopping ( $A_1$ ).

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According to Table 5 and Table 6, the regression equation of dependent variable  $A_1$  is:

$$\hat{A}_1 = -0.847 + 1.093X_2 + 0.526X_4 \quad (1)$$

From Eq.(1), GCs' purchasing behavior for green products depends largely on "X<sub>2</sub>-Social culture" and "X<sub>4</sub>-Economic level". They focus on scientific methods of consumption, denying behaviors that would cause environmental pollution. In addition, they express high requirements for life and show their clear value orientation. Their pursuit for consumption tends to be diverse after their basic living conditions get satisfied. Finally, spiritual fulfillment becomes their main pursuit.

### 3.2. Regression analysis results of $X_1 \sim X_6$ with $A_2$

Using the same regression process, the regression analysis result of independent variables  $X_1 \sim X_6$  and dependent variable  $A_2$  can be obtained in Table 7.

**Table 7: Coefficient  $A_2$**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.680	0.852		1.972	0.059
X <sub>2</sub> : Social culture	0.728	0.231	0.511	3.148	0.004
2 (Constant)	-0.672	0.888		-0.756	0.456
X <sub>2</sub> : Social culture	0.828	0.186	0.582	4.451	0.000
X <sub>4</sub> : Economic level	0.691	0.168	0.538	4.117	0.000

**Dependent Variable:** In the process of consumption, I pay more attention on green consumption ( $A_2$ ).

The regression equation of dependent variable  $A_2$  is:

$$\hat{A}_2 = -0.672 + 0.828X_2 + 0.691X_4 \quad (2)$$

From Eq (2), "X<sub>2</sub>-Social culture" and "X<sub>4</sub>-Economic level" get the same result when performing regression on the  $A_2$  and  $A_1$ . So, the relationship among the two independent variables and the GCs' behavior is stable and consistent. However, there were still different points. From the regression on  $A_2$ , "X<sub>2</sub>-Social culture" factor's influence on the dependent variables is still dominant; Meanwhile, "X<sub>4</sub>-Economic level" factor's importance to  $A_2$  is also much more significant than that to  $A_1$ , which indicates that whether a consumer can be green relies much on the consumer's attention on spiritual life and concerns about surrounding environment.

### 3.3. Regression analysis results of $X_1 \sim X_6$ with $A_3$

Using the same regression process, the regression analysis result of independent variables  $X_1 \sim X_6$  and dependent variable  $A_3$  can be obtained in Table 8.

The regression equation of dependent variable  $A_3$  is:

$$\hat{A}_3 = -0.826 + 0.615X_2 + 0.589X_1 \quad (3)$$

From Eq.(3), "X<sub>2</sub>-Social culture" is still important to  $A_3$ . The second factor, "X<sub>1</sub>-Consumption order" has a significant effect on  $A_3$ . In the perspective of consumers, it is the disordered consumption order that precisely causes the existence of frequent counterfeit green goods and lack of complaint channels, or the ignorance of complaints. Due to asymmetry of the



information, consumers' own interests and the surrounding environment have been compromised. That is why they need to fight against all of them to radically solve the problems brought by the poor order.

**Table 8: Coefficient  $A_3$**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.289	0.803		1.604	0.120
$X_2$ : Social culture	0.846	0.218	0.591	3.880	0.001
2 (Constant)	-0.826	1.215		-0.680	0.502
$X_2$ : Social culture	0.615	0.229	0.430	2.684	0.012
$X_1$ : Consumption order	0.589	0.266	0.355	2.217	0.035

**Dependent Variable:** I am willing to fight against acts of harming consumers' health and damaging the environment ( $A_3$ ).

### 3.4. Regression analysis results of personal information variables with $A_1 \sim A_3$

We also try to add personal information variables into regression analysis on  $A_1 \sim A_3$ . However, the results show that " $X_2$ -Social culture" serves as a steady predict factor on the three dependent variables from  $A_1 \sim A_3$ , the predict effect of " $X_4$ -Economic level" on  $A_1$  is the same to  $A_2$  and the impact of " $X_1$ -Consumption order" on  $A_3$  is always significant. The results mean that there are no demographic variables in the regression model. So, whether considering the differences of personal background or not, it would not make a difference to regression results of  $A_1 \sim A_3$ .

## 4. CONCLUSION

Following conclusions can be obtained from the process above.

- Based on the analysis, six factors can be obtained. They are consumption order, social culture, social groups, economic level, consumption habits and consumption popularity.
- Social culture and economic level will affect the GCs' initial choice of green products ( $A_1$ ).
- Social culture and economic level will also affect the GCs' performance in the process of green consumption ( $A_2$ ).
- Social culture and consumption order will affect the GCs' responsibilities ( $A_3$ ), which can be judged by their willingness on struggling against bad behaviors.

As a type of moderate consumption, green consumption avoids or reduces the damage to the environment, advocating natural lifestyle and protecting the ecology. This paper wants to figure out the internal relationship between GCs' psychology and green consumption, as well as the factors which may influence GCs' behavior. Based on the result, we can find some better ways to promote green consumption.

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# **THE ROLE OF EMOTIONAL INTELLIGENCE, EMOTIONAL LABOR ACTING AND EMOTIONAL EXHAUSTION AMONG BANK FRONTLINE EMPLOYEES**

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**Abstract:** The study tested the role of emotional intelligence, emotional labor acting and emotional exhaustion in the bank industry. More specifically, the purpose of this study was to examine whether and how the emotional intelligence and emotional labor acting, which are, consist of surface acting and deep acting influences emotional exhaustion. The survey was administered in banks in Jakarta. Multiple regression analysis provided support for the hypotheses from a sample of 78 frontline banks employees in Jakarta. The results showed that emotional intelligence has a negative effect on emotional exhaustion. Furthermore, It was found that surface acting has a positive influence on emotional exhaustion; the higher surface acting will be higher emotional exhaustion whereas deep acting has a negative influence on emotional exhaustion. The frontline employees engaging in deep acting reduced emotional exhaustion while those engaging in surface acting increased their emotional exhaustion.

**Keywords:** Emotional Intelligence, Surface Acting, Deep Acting, Emotional Exhaustion

## **1. INTRODUCTION**

Era of globalization requires companies to be able to make decisions in terms of appropriate strategies in order to compete in an increasingly stringent industry environment and competitive. One of them was a competitive level of business service sector industries, particularly in the banking industry in Indonesia. Because of the increased competition, many organizations put emphasis on "service with a smile" to maximize service quality and satisfaction of their customers (Kim *et al.* 2012). In managing services provided employees, emotional display has been recognized as an important aspect of maintaining customer loyalty.

Most of the reputation of a bank is determined by the attitude of frontline employees in providing high-quality service to customers. When frontline employees are aware to keep the ethics, manners, morality, and good attitude, customers will be more convinced to the reputation and the credibility of the bank. That's why frontline employees are expected to be able to manage their emotional displays and can be emotionally friendly when interacting with customers (Karatepe, 2010). The ability to manage these emotions is associated with a

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person's emotional intelligence.

Emotional intelligence is a set of how an individual's ability to understand, manages, use, and maintain their emotions. Emotional intelligence is becoming an interesting topic of several studies. One interesting thing is that emotional intelligence has a very important role in achieving career success and performance. There have been some success stories of organizations that implement emotional intelligence, Hay Group found that salespeople at five hundred companies with high emotional intelligence, which produces twice the value of the median income<sup>1</sup>.

Employees with high emotional intelligence can manage their own impulses in the heart, to communicate with others effectively, manage change well, solve problems, and use humor to build rapport in tense situations. These employees also have empathy, always optimistic even in the face of adversity and resolve customer complaints in a customer service role. Can think clearly and calmly in the face of stressful and chaotic situations is what is needed in the work environment.

Most companies have the perfect idea to provide services that exceed customer requirements. Moreover, the company equips service technology and service systems are very sophisticated. The goal is that customers can feel the reputation and credibility of the company. However, technology, systems, and beautiful frontline employee uniforms when not followed by a genuine smile, good attitude, and ease in providing services then all the greatness of the company would be a futile thing. Surface is believed to be acting as something experienced by frontline employees. They are required by organizations to meet directly face the customers and serve customers with friendliness. In the other hand, they do not always quickly return well manage their emotions when dealing with a customer when the mood is bad (Hochschild, 1983; Blau *et al.* 2010). Circumstances where frontline employees than the company is spearheading, seen clearly in the banking world.

Entering the 1990s, the central bank issued a policy package in February 1991, which contains provisions. It requires banks to be careful in its management. In 1992, they also issued replace Law Banking Law.14/1967. It is a change in the classification of types of banks, i.e. commercial banks and rural banks. Under Law No.7 of 1992, it set back the banking structure, scope of activities, establishment requirements, increasing protection of public funds by way of applying the precautionary principle and meets the requirements of the bank, as well as the increased professionalism of the perpetrators.

All of them encourage new banks established to provide training related to emotional labor consisting of surface acting and deep acting with the aim of improving service to customers. With the demand to always give priority to the service, making the employee or in whole may experience emotional exhaustion.

Emotional exhaustion is reduced energy and feelings of a person because of excessive psychological demands (Cordes and Dougherty, 1993). They state of emotional exhaustion associated with the depletion of one's emotions as a result of mental fatigue, and frustration. Babakus *et al.* (1996) found that frontline employees who lack emotional energy were not satisfied with his work.

Emotional exhaustion can arise as a response to excessive stress or result in job dissatisfaction. The existence of frontline employees plays an important role to provide a quality service. Therefore they tend to show signs of emotional exhaustion (Ledgerwood *et al.* 1998).

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<sup>1</sup> [www.zeroriskhr.com / articles / emotionalintelligence.aspx.com](http://www.zeroriskhr.com/articles/emotionalintelligence.aspx.com)

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Emotional exhaustion is one of the important factors in explaining the attitude and behavior of frontline employees in the work environment with high levels of stress (Babakus *et al.* 1996). Frontline employees of some banks that are in the area of Pondok Indah is the most important part in the chain that provide their services because they are at the forefront and directly dealing with customers. If they have high emotional intelligence, they will be able to minimize the occurrence of emotional exhaustion.

## 2. RELATED LITERATURE

### 2.1. Emotional intelligence

Emotional intelligence (EI) is a new concept in the hospitality industry. Yet through recent research, emotional intelligence is expressed as a concept in business services (Cha *et al.* 2009; Cichy, 2007; Kim and Agrusa, 2011; Langhorn, 2004; Magnini *et al.* 2011).

Emotional intelligence is generally expressed as the ability or skill in which an individual can understand, set up, use and adjust their emotions to the circumstances around them (Law *et al.* 2004). There are two different approaches to the concept of emotional intelligence and operations, the model capability and the model mix. Model capability states that emotional intelligence is an ability that facilitates the perception, expression, assimilation, understanding, and regulation of emotions that encourage intellectual and emotional development of the individual (Day and Carroll, 2004). Individuals who have high emotional intelligence have the ability to understand and express their emotions, recognize the emotions of others around him, is able to adjust the effect of giving to others, and using emotions to be as adaptable behavior (Salovey and Mayer, 1990; Wong and Law, 2002 cited in Kim *et al.* 2012). While the mixed model of emotional intelligence by Bar-On cited in Kim, *et al.* (2012), that see a combination of capabilities, such as personality traits, and skills.

Ashkanasy and Daus (2005) stated that emotional intelligence is the ability to accept emotions, to access and generate emotions, so it helps to understand the emotional nature and knowledge about emotions and emotional control in order to encourage intellectual and emotional development of the individual.

Emotional intelligence refers to the ability to receive and understand information and generates and regulates emotions that drive emotion emotional and intellectual development (Salovey and Mayer, J.D., 1990)

Based on the above it can be concluded that emotional intelligence is a thorough understanding of what is actually meant by emotion, how to control it, develop it into a more positive direction, and encourage a person to be able to encourage the development of emotion toward more intelligent and intellectual.

Frontline services industry requires employees to organize, match, and control their emotions effectively, it is characterized by the ability of employees to interact with customers in person or face-to-face (Karatepe, 2011). Thus, in this case requires the ability to regulate emotional intelligence of their employees, so as to maintain the consistency of the quality of services provided. Therefore, it is important for service managers to understand the influence of emotional intelligence to the results obtained by the customer.

Love *et al.* (2011) issued a statement that EI is the best predictor for the success of life, in other words that a person who can apply EI in his life is an intelligent person. Goleman (1998) and Love *et al.* (2011) stated that EI could predict leadership effectiveness relationship. Where a manager who has a high EI, it will produce increasingly better performance, especially in occupations that have high interaction with clients or customers and requires emotional demands.

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Hence the importance of the role of EI in an organization, it is important to note the role of EI in the role of a manager in the running responsibilities in the organization (Love *et al.* 2011). This, among other things: (a). Main tasks: Negotiate with supervisor personnel, owner, contractor, and design professionals to discuss and resolve issues such as work procedures, complaints, and construction problems. To prepare contracts and negotiate revisions, changes and additions in the contractual agreements with architects, consultants, clients, suppliers and subcontractor; direct and supervise workers, (b). Key skills: Instructing-teach others about how to do something, Active listening-give undivided attention to what is said by others, using the time to understand the points, asking questions as appropriate, and not interrupt at inappropriate times, Judgment and decision making- taking into account the relative costs and benefits of decisions that have been adapted to the circumstances, Negotiation-together with other people and try to adjust differences, (c). Key personalities: Dependability- Job requires a reliable party, responsible, trustworthy, and able to fulfill the responsibilities well, Leadership-Job requires a willingness to lead, takeovers, and provide opinions and the right direction, Self-Control- Job requires the ability to self-control, keeping emotions well, controlling anger, and avoiding aggressive behavior, even in a difficult situation though, Stress tolerance-jobs require employees to accept criticism and deal calmly and effectively can face stressful situations, Cooperation- Job requires employees who are friendly with others, and demonstrate good behavior and cooperative attitude, Innovation-Job requires employees who are creative and have a variety of alternatives in thinking and able to develop new ideas for answering the problems related to the job, Adaptability / flexibility- Job requires employees who are open about the changes either positive or negative for the work environment are manifold and initiative-jobs require employees who dared to take on responsibilities and challenges.

Based on the above it can be seen that the EI benefits not only for managers to be able to improve its performance in the work, but also for the organization, due to the number of employees who have high EI, they can manage and control their emotions, and trying to provide the best possible service to customers, and this can increase customer satisfaction. That way it does not directly benefit companies with the enactment of the rule, which requires that every employee should have a high EI.

Emotional intelligence employees are measured using the EI scale developed by Wong and Law (2004). The scale is based on previous research conducted by Salovey and Mayer (1990), which discusses the basic concepts of measuring EI. The measurement concept, among others: Self Emotional Appraisal (SEA), an individual's ability to understand their deepest emotions and can express their emotions naturally. One example of this item is "I have a good feeling about why I have certain feelings from time to time"; Others' Emotional Appraisal (OEA) an ability to accept and understand the emotions of those who are around them. One example of this item is "I always knew my friends emotions from their behavior"; Regulation of Emotion (ROE) is the ability of people to control their emotions, which allows a faster recovery from psychological difficulties perceived. One example of this is the item "I am able to control my emotions so that I can solve problems rationally"; Use of Emotion (UOE) an individual's ability to utilize their emotions through activities useful and can improve personal performance. One example of this item is "I always make goals for myself and try my best to achieve it".

In addition, there is another opinion which states that the most popular measure for measure EI based on individual perspective by using the MSCEIT (Salovey and Mayer, 1990). Measurement MSCEIT EI through this method is now recognized as the most relevant academic literature, and features contained therein, among others: emotional perception, the ability to identify what is perceived by others correctly; emotional facilitation of building emotions and feelings, unite into a single understanding or thought; emotional understanding, the ability to understand the causes of the absence of emotion; emotional management, the ability to figure out an effective strategy to use emotions to achieve the

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desired goal, compared with existing emotional misuse.

## 2.2. Emotional labor

In order to increase competition in the service industry, organizations must be more emphasis on "service with a smile" to maximize the quality of service and increase customer satisfaction. Regulate emotional employees who provide services to customers, are a very important aspect in order to maintain a loyal customer to the organization. Therefore, frontline employees are expected to be able to regulate their emotions and considerable efforts in providing a friendly service, friendly when interacting with customers (Karatepe, 2010).

Hochschild (1983) states that the efforts made by the employee related to emotion regulation are known as emotional labor (emotional labor). It is an arrangement that both physical and mental feelings of an individual from expressing his emotions in accordance with the rules of the organization apply.

Emotional labor typically use surface acting (SA) is a gesture in which employee pretending to express what he should do to provide good service to customers in accordance with the rules in force in the organization and deep acting (DA) is experiencing what is really wanted expressed by employees in providing services to customers (Hochschild, 1983).

So far based on previous studies, lead to the conclusion that emotional labor (EL) can affect customer satisfaction, as customers are able to distinguish a fake smile or made-up with a sincere smile and customer perceptions regarding authenticity than the smile can affect their satisfaction (Pugh, 2001). In addition to the emotional labor can also provide negative consequences such as stress, emotional fatigue or emotional exhaustion and depression (Prati *et al.* 2009).

### 2.2.1. Surface acting

Surface acting is external regulation of emotional expression as opposed to the feeling in the hearts of true (Hochschild, 1983). Surface acting is the ability to be able to display different emotions from what is actually perceived and often times required to smile with friendly faces despite their mood was not good (Growth *et al.* 2009).

Surface acting is also expressed as a situation where an employee is forcing himself to smile for the sake of the demands of the job even though they are not happy (Mansor, 2010). This is supported by Seery and Corrigan (2009) who states that surface acting is an attempt to present the appropriate emotion or attitude that just needed it (like a smile) when the person is not here to feel happy or want to do so. In other words, requires the pretense of showing the expression of emotion and it is exactly what does not fit with the real emotional.

Surface acting involves emotional expression employees required by their jobs without actually feel the emotion, as an example of an employee faking a smile to customers and hide their true feelings felt. According to Zapf *et al.* (1999) cited in Karatepe (2011), surface acting occurs when employees falsified their emotions by changing the attitude will be shown to confirm with rules adopted by the company, while the feeling in the heart remains unchanged.

Grandey (2003) explains that surface acting in accordance with the response to regulatory focus where employees have changed their outward expression through suppression, pretense, and strengthen emotional appearance that looks from the outside.

Several previous studies have examined the influence exerted by the presence of surface

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acting and the results were negative. This is because both the existing legislation is different from the perception of employees. Employees, who are required to quell anger or express their true feelings, feel that they are losing their freedom to express feelings that they want to show.

Feelings of employees who feel like removed, should be arranged in such a way so as not to be known by others, so they chose to perform surface acting to cover up what they feel. Their actions in order to perform surface acting is to provide a smile to others, especially customers, but it is not in accordance with what is actually perceived, so it tends to produce something that the customer is considered as something boring or even disturbing (Rutner *et al.* 2011).

It can be concluded that surface acting are circumstances and situations in which an employee falsifying their emotions, forcing to smile and hide the true feelings they feel to the customers. It is caused by the rules applied in that company and a must do it job requirement.

Based on all of them, the influence is exerted by a surface acting negative impact on employee performance. Surface acting is an attempt by the employee to demonstrate the expression that opposite to what they feel. In this case, if employees tend to feel that they have the freedom to be able to express what they feel, it will have negative impact to the perception of customers. Thus, if their acceptance of such employee's attitude is negative, then of course it will be a negative impact on the relationship between the service providers to the customer.

### 2.2.2. Deep acting

Deep Acting (DA) is experiencing what really wish expressed by employees in providing services to customers. In other words, the DA requires modification of the employee to express emotional feelings as desired organization.

### 2.3. Emotional exhaustion

Emotional exhaustion (EE) by Wright and Cropanzon cited in Kim, *et al.* (2012), is an emotional feeling tense and tired due to work. EE appeared in a stressful work environment, stress, and significantly affect the quality of work life (Zopiatis and Constanti, 2010). Geng *et al.* (2011) states that emotional exhaustion is excessive emotional feelings and venting through contact with other people. Wittmer and Martin (2010) states that emotional exhaustion is the lack of energy that is accompanied by feelings of stress are individually owned. Emotional exhaustion is typically accompanied by feelings of frustration and anxiety (Cordes and Dougherty, 1993). Emotional exhaustion is due to a decreased level of an individual's emotional demands continual and excessive that adversely impacts the performance of employees. Emotional exhaustion is the reduction of sources of emotional and involve feelings of fatigue and tiredness, feeling had given "everything", and feels frustrated.

Based on the explanation above, it can be concluded that emotional exhaustion is feeling tense, tired, and frustrated due to the many pressures, or the number of requests from organizations and customers that make employees feel even already issued all his ability, but was not obtained in accordance with expectations.

Among the three elements of burnout, EE is enough to attract attention because of its importance as the first stage of burnout; EE tends to act as a successful problem solving. EE an important influence because for anyone who works in the service industry who interact with other people, EE served to increase the level of staff turnover and can lead to reduced



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quality of service by Cropanzano, Rupp, & Byrne cited in Geng *et al.* 2011)

Increased EE implies that the sources of emotions slowly drain to the feelings of employees is not able to reach a certain psychological level. High levels of EE predict important organizational outcomes such as job performance, turnover rate, and voluntary employee turnover. Companies with high turnover rates tend to cost more. So in this case the EE should be controlled and only used as one measurement of turnover in an organization only.

### 3. CONCEPTUAL FRAMEWORK

In the service industry, service providers are enormous role in the formation of customer satisfaction. There are some things that are done during the process of delivery service employees to customers, and this greatly affects the final result in the perception of both customers and employees' perceptions.

In managing the emotions of employees, also known as emotional intelligence, the ability to understand and express emotions employees, recognizing the emotions of others around him, is able to adjust the effect of giving to others, and using emotions to be as adaptable behavior (Salovey and Mayer, 1990; Law *et al.* 2004).

Emotional labor can also provide negative consequences such as stress, emotional fatigue and depression (Prati *et al.* 2009). Emotional labor consists of surface acting and deep acting. Surface acting is the full expression modification efforts, aiming to ensure delivery services in accordance with the applicable rules even if performed by employees with what is perceived mismatch with actual employees (Song and Liu, 2010). Emotional exhaustion is the lack of energy that is accompanied by feelings of stress or frustration individually owned (Wittmer and Martin, 2010).

Based on research conducted by Seery and Corrigan (2009) regarding the relationship between work behavior and emotional exhaustion concluded that surface acting and deep acting had a positive effect on emotional exhaustion. This is supported by research conducted by Rutner *et al.* (2011) regarding the influence of emotional labor in the IT world, lead to the conclusion that surface acting and deep acting had a positive and significant impact on emotional exhaustion. This is consistent with results from previous studies (Song and Liu, 2010).

The conceptual framework can be structured as follows (Figure 1):

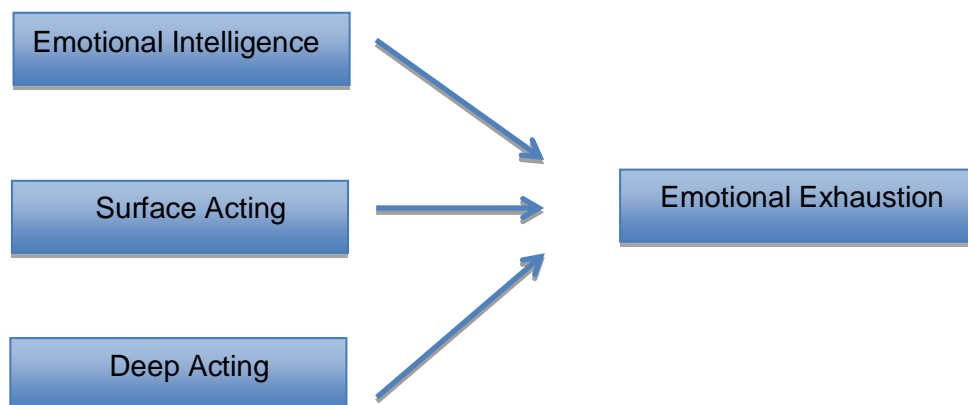


Figure 1: Conceptual framework chart

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## 4. HYPOTHESIS DEVELOPMENT

Several studies have produced findings if the emotional sources have a direct influence on employee performance (Kim *et al.* 2012) also found that emotional intelligence could reduce emotional exhaustion. Therefore, the first hypothesis is:

H1: There is a negative effect of emotional intelligence to emotional exhaustion.

Individuals have a limited amount of resources and reduction of emotional resources resulting from the increased number of continuous duty. If this assumption is valid, then with this condition, the SA spend resources more emotion than the DA. Empirical studies also support it. Kim and Agrusa (2011) found that SA has a positive relationship with EE.

It is also supported that is a positive influence on EE as well as the DA who has a negative effect on EE. It is also in line with research conducted by Kim *et al.* (2012) regarding emotional intelligence strategies and acting emotional labor among frontline employees, which resulted in the conclusion that the employee is trying to be to cover up what he felt, would eventually lead to the emergence emotionally exhausted at work, because he felt that he was running something with which he does not expect, in other words there is a positive effect of surface acting on emotional exhaustion and negatively influence the deep emotional acting against exhaustion. Based on previous research, it can be arranged hypothesis, namely:

H2a: There is a positive effect between the surface acting on emotional exhaustion

H2b: There is a negative effect between deep acting on emotional exhaustion

## 5. VARIABLES AND MEASUREMENT

A variable is a concept that has value variation. In this study, there are several variables that will be used. These variables are emotional intelligence, surface acting, deep acting and emotional exhaustion.

### 5.1. Emotional intelligence

Emotional intelligence was measured using sixteen statement items are divided into four sections, presented by Kim *et al.* (2012). Sixteen items are: (a). Self-emotion appraisal: I have sensitive senses, so I can always read the feelings that I feel with the right, I have a good understanding of my emotions, I really understand what I feel, I always know if I'm happy or not. (b). Other's Emotion Appraisal :I always knew my coworkers emotions from their behavior, I am a good observer of the emotion of my work friends, I am sensitive to the feelings and emotions of others, I have a good understanding of the emotions of those around me. (c). Use of Emotion: I always set goals for myself, then try the best I can, to achieve that goal, I always told myself that I was a competent person, I am a person who always motivate yourself, I always push myself to do my best. (d). Regulation of Emotion: I am able to control my emotions and handle difficulties rationally, I was able to control my own emotions, I can always calm quickly when I'm angry, I can control my emotions well .

Sixteenth statement above items were measured using a Likert scale of 1 to 5 , where 1 = Strongly Disagree , 2 = Disagree , 3 = Quite Agree , 4 = Agree , and 5 = Strongly Agree .

### 5.2. Surface acting

Surface acting was measured using a five- item statement proposed by Kim *et al.* (2012) these five items are: (a). When it did work, I often smile to customers; (b). When it did work. I often behave to customers in a way that is good and right; (c). When it did work, I often pretend to show a good emotional (mood) when dealing with customers; (d). When do the job, I often show my work ability to interact with customers; (e). When it did work, I often

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pretend to show emotion that is already available to do the job.

The fifth item above statements are measured using a Likert scale of 1 to 5 , where 1 = Strongly Disagree , 2 = Disagree , 3 = Quite Agree , 4 = Agree , and 5 = Strongly Agree .

### 5.3. Deep acting

Deep Acting measured using three items proposed statement by Kim *et al.* (2012). These three items are: (a). I tried to download the actual show emotions that are shown to the customer; (b). I work hard to feel the emotions that I need to show to customers; (c). I try to establish themselves in the emotions to be shown to the customer.

### 5.4. Emotional exhaustion

Emotional exhaustion was measured using the eight- item statement proposed by Kim *et al.* (2012). Eight items were: (a). I feel emotional I get out, due to my work; (b). I feel exhausted after work; (c). I feel tired when I wake up in the morning and have to deal with my work again; (d). Dealing with people at work every day is a torture for me; (e). I feel tormented by my work; (f). I feel frustrated, due to my work; (g). I was working too hard for work performed; (h). I feel no hope for a job well done.

The eight items above statements are measured using the Likert method of interval scale of 1 to 5, where 1 = Strongly Disagree, 2 = Disagree, 3 = Quite Agree, 4 = Agree, and 5 = Strongly Agree.

## 6. DATA COLLECTION AND TECHNIQUES ANALYSIS

This study did not use sampling methods but using census research method because it uses the number of respondents in all populations frontline employees who work in a bank located in the area of Pondok Indah Jakarta as many as 78 people.

In conducting the study required data related to the problem to be investigated for further data can be processed and then can be concluded. The source of the data obtained from the questionnaire where questionnaires conducted to obtain primary data in this study. The questionnaire is a data collection technique is done by giving a series of questions or statements that the respondent bank employees contained in the Pondok Indah Jakarta to obtain answers to these questions in order to obtain data relevant to the research objectives. Profile contains a list of questions about the respondent and statements regarding emotional intelligence, surface acting, deep acting and emotional exhaustion. To analyze the effect of emotional intelligence, surface acting, deep acting on emotional exhaustion method will be used multiple regression with SPSS.

## 7. ANALYSES AND DISCUSSION

The data are analyzed by multiple regressions with SPSS. Basis for decision-making is if the p value < 0.05 then  $H_0$  is rejected, if the p value > 0.05 then  $H_0$  failed to be rejected (Table 1).

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**Table 1: Regression test results**

Hypothesis	p-Value	Decision
H1: there is a negative influence between emotional intelligence and emotional exhaustion	0.0001	Rejected
H2: There is positive effect between surface acting and emotional exhaustion	0.0000	Rejected
H3: there is a negative effect between deep acting and emotional exhaustion	0.0001	Rejected

Based on the data processing p-value for the hypothesis  $0.001 < 0.05$ . Thus  $H_01$  was rejected. The coefficient of -0.569 shows there is negative influence on emotional intelligence and emotional exhaustion. This means the more emotional intelligence that employees have, the less emotional exhaustion they feel. The results of this study are consistent with previous research findings.

The second hypothesis was  $0.000 < 0.05$ . Thus  $H_02$  rejected and  $H_{a2}$  acceptable. Coefficient of 0.578 shows a positive direction among surface acting with emotional exhaustion. This means that the more often employees perform surface acting, the higher the likelihood of employees experiencing emotional exhaustion. The results for this hypothesis are also consistent with less results of a previous study conducted by Kim *et al.* (2012).

For the third hypothesis that has particularly p value  $0.001 < 0.05$ , and a coefficient of -0.343, the more often deep acting is done by an employee then also reduced emotional exhaustion. In the service business, determining the criteria of good service quality is very important. This could be due to the competitive advantage of the company's service provider, which is not shared by other competitors. Therefore, the human resource manager in a service -oriented company should give emphasis to its employees about emotional management, especially for those working as service providers. The service provider must provide service with a smile. This makes customers feel something different, because of the quality good service, of course not only comes from within just like the products offered, but also look outside, especially from the service provider.

From the table, hypothesis testing shows that the higher the value of emotional intelligence, the more reduction in emotional exhaustion they feel. These results are similar to the research conducted by Abraham (2000) and Prati *et al.* (2009). Employees who have a high emotional intelligence, the ability to regulate their emotions and then customize it with the company's rules of service criteria that must be shown in front of the customer. Other research supports the research done by Grandey (2003) and Groth *et al.* (2009) in which emotional intelligence plays an important role in the service industry, which in the industry is needed good relationships with customers and how to manage employees, concerned their emotions.

Sometimes employees find it difficult to control their emotions, so sometimes they show what should not be allowed by the rules of the company. This is because they have not mastered how to control their emotions so that they do not need to fully perform surface acting, which in turn will only make them trapped in a high level of stress and burnout (emotional exhaustion).

Emotional intelligence plays a role as an ability of an individual to control their emotions in the face of influences that come from outside themselves. Employees who have good emotional intelligence they will be able to cover what they feel and make their performance

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more quickly affected than employees who are not able to regulate their emotions. Employees with high emotional intelligence can behave according to the rules. They need to express their feelings at the time and the right place.

As the results of the study of Abraham (2000) explains that the presence of emotional intelligence which is owned by an employee of the service provider that has high activity to meet with the customer, it will make it easier to regulate their emotions and do not pretend in front of customers, so not easy for him to feel fatigue due to cover what she feels.

The results showed that surface acting is a proven ability to be able to display different emotions from what is actually perceived and often required for a friendly smiling faces though the mood was not good service provider (Groth, et al 2009) has a positive influence to emotional exhaustion which is a form of expression in the form of service providers stress, negative emotions and fatigue caused by their work (Zopiatis and Constanti, 2010). This is consistent with research conducted by Kim *et al.* (2012). The employee is trying to be to cover up what is perceived, will eventually lead to the emergence emotionally exhausted at work, because he felt that he was running something with which he does not expect, in other words there is a positive effect of surface acting on emotional exhaustion.

Employees who work on the frontline in the banks contained in Pondok Indah, they stated that when working they find themselves not being due to the demands of the job. This condition makes them psychologically feel that this work is quite heavy and a lot of spending power. Because it is in every bank has a similar regulation for all frontline employees that any employees who deal directly with customers must have some criteria in carrying out its duties, among other things decently dressed, neat and clean, simple to use make -up for women while for men has order neat and short hair, use the name as a badge of identity and the hardest part is they should always be able to give a smile to customers under any circumstances, and responsive to customer needs. This is what also makes them have a high emotional exhaustion in doing his job.

Deep acting has a negative effect on emotional exhaustion due to employees who do not need to pretend to be they would not feel emotionally exhausted at work.

### 8. CONCLUSION

From the analysis of the data suggests the hypothesis that the p - value for the emotional intelligence to emotional exhaustion at  $0.001 < \alpha$  value of 0.05 with a coefficient of -0.569. This suggests that there are significant negative direction at a variable negative emotional intelligence and emotional exhaustion. That is the better emotional intelligence possessed by an employee then the lower the emotional exhaustion they feel.

For the second hypothesis the resulting p-value of  $0.000 < 0.005$  alpha is the effect of surface acting on emotional exhaustion. Coefficient values were obtained for 0.578 indicates a positive direction between the two variables. This means that more and more employees must perform surface acting, the higher the emotional exhaustion that they can feel.

The latest results showed a negative effect between deep acting on emotional exhaustion with p-value  $0.001 < 0.005$  and the coefficient alpha generated at -0.343. This means that significantly affect emotional exhaustion deep acting negatively, the more deep acting is done by an employee in the sense that they can show the behavior for what it is in the works, then his emotional exhaustion will also be reduced.

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## 9. MANAGERIAL IMPLICATIONS, LIMITATION, AND SUGGESTION FOR FUTURE RESEARCH

Based on the conclusions, the suggestions to the leadership of these banks is to provide training to maximize emotional intelligence are owned by their respective employees and associated with personality as a way to control emotions and provide the best way to deal with customers.

Limitations of this study are: (a). This is only one type of service companies, (b) Variables examined only emotional intelligence, surface acting, deep acting, and emotional exhaustion. The advice can be delivered based on the research results obtained so the results can be more perfect than the previous studies are: (a). Researching on different service companies such as restaurants, hotels, and airlines. (b). Adding other variables such as job satisfaction, organizational citizenship behavior, enriches their knowledge especially related to human behavior in organizations

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# EFFECTS OF REAL EXCHANGE RATE ON EXPORT PERFORMANCE IN EGYPT: VOLATILITY VERSUS MISALIGNMENT

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**Abstract:** Persistent volatility and sustained "wrong" level of real exchange rate would have an adverse impact on the degree of competitiveness of the developing countries. As such, the study is motivated by estimating formal measures for both volatility and misalignment. Importantly, studying Egypt is motivated by the introduction of a floated exchange rate regime in January 2003. This regime shift rendered the exchange rate an active monetary transmission mechanism channel. Methodologically, to quantify the volatility, the study applies two types of models, the univariate ARCH-type model and the Stochastic Volatility model. As for the misalignment measure, the paper will follow Edwards' model (1989). The empirical results give intuitions to the exchange rate policy formation, which will in turn work on improving the degree of competitiveness of the export sector.

**Keywords:** Real Exchange Rate Misalignment, Volatility Measure, ARCH-Type Models, Stochastic Volatility Models, Export Performance

## 1. INTRODUCTION

One of the important issues that caught the interest of researchers, economists and policy makers alike is the issue of Real Exchange Rate (RER) misalignment. Edwards (1989) argued that sustained "wrong" level of real exchange rate for an extended period would have an adverse impact on the degree of competitiveness and the economic performance of the developing countries (Razin and Collin, 1997).

Being a monetary transmission mechanism channel, it is important to monitor the exchange rate dynamics in both developed and developing countries, likewise (see in this context, Lam *et al.* 2008; Engel *et al.* 2012; Bianco *et al.* 2012). As per (Mishkin, 1996) the exchange rate channel plays an essential role in how the monetary policy can affect the domestic economy. Recently, this becomes critical especially in a world where capital and financial markets are highly integrated and associated risks are increasing. Moreover, in developing countries, the exchange rate plays an essential role in affecting the macroeconomic stability (Fetai and Zeqiri, 2010; Rummel, 2012). This occurs because other channels such as the lending or the asset price are underdeveloped in those economies.

Additionally, economies around the globe are prone to various shocks that lead to higher levels of volatility and uncertainty. This can render the traditional models inefficient in gauging the volatility, since the relationships among economic variables are expected to alter with changes in economic conditions; an example is given by (Mark and Sul, 1998). Accordingly, most of the central banks are now operating in the light of a great uncertainty

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and changing economic environment. This has called for new techniques that could help the policymakers to get better insights about the financial and economic variables of interest.

As such, a vast range of theoretical and empirical literature has been carried out on the approaches used to estimate the observed real exchange rate and the equilibrium real exchange rate to capture the magnitude of misalignment (Doroodian *et al.* 2002; Hallett and Richter, 2004; Nabli and Veganzones-Varoudakis, 2004; Etta-Nkwelle, 2007; Giannellis and Papadopoulos, 2007; IMF, 2007; Yajie *et al.* 2007; and Benassy-Quere *et al.* 2009). While other studies, have tried to quantify the impact of the misalignments on either trade flows or economic growth especially for the less developed countries (Cottani *et al.* 1990; Razin and Collin, 1997; Bouoiyour, 2005; Toulaboe, 2006; Gala and Lucinda, 2006).

Moreover, to model volatility, an enormous amount of literature suggests two sets of models: the Autoregressive Conditional Heteroscedasticity (ARCH) type models and the State Space (SS) models. ARCH type models capture the volatility, as a deterministic observed process as shown in (Antonakakis, 2007; Nedeljkovic and Urosevic, 2012; Ramzan *et al.* 2012). Whereas, SS models estimate the variance as an unobserved random process; examples are presented by (Canova, 1993; Kumar, 2010; Mumtaz and Sunder-Plassmann, 2010; Altavilla and Grauwe, 2010). Evidently, it is indicated that the SS models outperform ARCH type models, because they fit more naturally into the theoretical framework of modern financial theory (Platanioti *et al.* 2005).

Empirically, most of the implemented research, which focused on estimating the effect of the RER misalignment on the trade flows, has incorporated measures for both the real exchange rate misalignment and volatility. The main findings of those papers show that there is a significant effect of misalignment on both exports and imports, while volatility appeared to be insignificant. It is noteworthy that these studies have been carried out using cross-country analysis, and some of these studies included Egypt in their sample (Pick and Vollrath, 1994; Nabli and Veganzones-Varoudakis, 2004).

In this context, the study was motivated by estimating a formal measure for both the volatility and misalignment. Importantly, couple of reasons motivates studying Egypt: first, the introduction of a floated exchange rate regime in January 2003. This regime shift rendered the exchange rate an active monetary transmission mechanism channel. Second, casual observations show differentiated patterns in the exchange rate returns over the study period that deserve the quantification of the volatility and misalignment components. Few empirical studies have been drawn for Egypt, which concluded that the real exchange rate was characterized by two distinct episodes of overvaluation during 1996-2002 and an undervaluation during 2003-2006 (Riad, 2008). Additionally, the IMF (2010) has estimated the RER misalignment and found that the RER was overvalued by 16% in 2009.

Accordingly, the study estimated the impact of the real exchange rate misalignment and volatility on the trade performance in Egypt measured by the exports flows covering the period 2001: Q3 - 2013: Q2. This was implemented on two steps: first, a measure for both the volatility and misalignment was estimated. Whereas, the second step focused on the estimation of the RER volatility and misalignment consequences, on the trade performance and competitiveness measured in terms of real export flows.

## 2. LITERATURE REVIEW

The literature review is divided into two parts. The first part sheds some light on the theoretical and the empirical literature, which shows different approaches used to measure the RER misalignment and volatility. The second part will give a brief review of the studies, which attempted to identify the consequences of the real exchange rate misalignments, on the trade flows.

In estimating the RER misalignments, the theoretical literature has focused on defining long-run equilibrium RER. In fact, there are two approaches in the literature, which constitute the theoretical basis for the RER misalignments measurement. The first focuses on the Purchasing Power Parity (PPP) approach, which was first introduced by Cassel (1916)<sup>1</sup>. While the second approach focuses on the model based techniques, which was first introduced by Edwards (1989)<sup>2</sup>. Subsequently, Williamson (1994) introduced the Fundamental Equilibrium Exchange Rate (FEER)<sup>3</sup>, then Clark and MacDonald (1998) provided a comparison between the Behavioral Equilibrium Exchange Rate (BEER) and the FEER estimates. However, it has been noticed that there is no consensus in the theoretical literature on a unique method to estimate real exchange rate misalignment.

Similarly, the empirical work has varied between the PPP and model-based spectrum. The model-based approaches dominate the empirical work for the developed countries. Razin and Collin (1997) applied a structural IS-LM model for 20 developed countries, to construct an indicator for the RER misalignment. Hallett and Richter (2004) employed the FEER on the US. Giannellis and Papadopoulos (2007) estimated the RER misalignment based on the BEER and PEER<sup>4</sup> approaches for a group of four European countries namely Malta, Poland, Hungary and Slovak Republic, and Benassy-Quere *et al.* (2009) based on the BEER approach for G-20. One interesting finding is that the terms of trade appeared to be one of the most important determinants of the equilibrium RER in those countries.

As for the developing countries, although the PPP has been entirely criticized, yet it is intensively used interchangeably with the market-based approaches. Cottani *et al.* (1990) applied PPP on a group of 24 less developed countries. Doroodian *et al.* (2002) employed the model proposed by Edwards (1989) to estimate the real exchange rate misalignment in Turkey. Similarly, Joyce and Kamas (2003) applied Edward's model on three Latin American countries namely, Argentina, Colombia and Mexico. Nabli and Veganzones-Varoudakis (2004) employed a dynamic model on 53 developing countries amongst them 10 MENA countries including Egypt, which adopt a unique nominal exchange rate. The results indicated that the Real Exchange Rate (RER) was over-valued during the 1970s and 1980s in the MENA countries. Yajie *et al.* (2007) employed the BEER on China and Etta-Nkwelle (2007) applied both the PPP and the model-based approach for a group of 11 African Financial Community (CFA)<sup>5</sup> countries. Finally, IMF Consultative Group of Exchange Rate Assessments applies model-based approaches on a group of advanced and emerging countries (IMF, 2006) in addition to Egypt using time series analysis as well as panel data analysis (IMF, 2007).

To model exchange rate volatility, although this topic was not covered broadly in the empirical literature, yet it was found that the ARCH-type models were applied in case of the developing countries, while the State Space (SS) models were utilized on the developed countries data. One justification is given by the fact that the latter models are used in a data-rich environment, which most of the developing countries lacked. McKenzie (1997) tested the

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<sup>1</sup> See Froot and Rogoff (1994) for detailed presentation of this literature.

<sup>2</sup> Edwards (1989) defines internal equilibrium as the clearing of the non-tradable market in the current period and in the future, implying that the market will be operating at the full employment level. While the external equilibrium is defined to be the attainment of the current account balance currently and in the future, this satisfies the inter-temporal budget constraint condition. It states that the discounted flow of the current account balances has to be equal zero given by 
$$\sum_{i=1}^n \frac{C_{t+i}}{(1+r)^i} = 0$$

<sup>3</sup> The Fundamental Equilibrium Exchange Rate (FEER) approach defines the equilibrium real exchange rate by embedding the potential economic growth rate and the sustainable current and capital flows, the IMF (2006) defines it as the External Sustainability (ES) Approach

<sup>4</sup> Permanent Equilibrium Exchange Rate (PEER) is a special case of the BEER. According to BEER approach, the exchange rate is a function of transitory and permanent factors. The PEER approach differs in the way that the equilibrium exchange rate is a function of variables that have only persistent effect on it.

<sup>5</sup> CFA stands for *Communauté Financière Africaine* (African Financial Community)

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ability of ARCH models to adequately capture the volatility of 21 daily Australian bilateral exchange rates between January 1, 1986 and October 31, 1995. The forecasting ability of these ARCH models was then compared to that of an AR and a Mean model using a number of evaluation measures. The results indicated that the forecasting performance of ARCH models is superior in the case of the Australian foreign exchange rate. Mumtaz and Sunder-Plassmann (2010) employed a Time Varying Parameter - Structural VAR model to examine the dynamics of the real exchange rate in the United Kingdom, Euro-Area and Canada on a dataset running from 1957:Q2 to 2009:Q1 (the starting date for the Euro-Area is 1961:Q4). Their estimation showed that real exchange rate volatility is more closely linked to changes in real activity and inflation after the mid-1980s and that the influence of demand and nominal shocks on the real exchange rate has played a greater role over time.

Turning to the consequences of the RER misalignments, both the theoretical and empirical studies concentrate on two main economic indicators: economic growth and the trade performance. In testing the impact of the RER misalignment on the economic growth, the empirical evidences for both the developed and the developing countries find that the relation between misalignment and growth is non-linear. In other words, overvaluation adversely affects growth while the reverse relationship is not proved (Cottani *et al.* 1990; Razin and Collin, 1997; Toulaboe, 2006; Gala and Lucinda, 2006). Moreover, addressing the relationship between the real exchange rate and the trade performance is relatively a recent issue, and the literature in that regard is divided into two main categories.

The first category concentrates on testing the relationship between the volatility of real exchange rate and trade flows. The first intuition for this relationship is the presence of a negative relationship between the uncertainty of the exchange rate and the trade flows; causing misallocation of resources.

Empirically, while Chowdhury (1993) found a negative relationship between exchange rate volatility and the real exports, the interpretations were based on the belief that the substitution effect exceeded the income effect; in the sense that the risk aversion exporters would reduce their supply to mitigate the impact of the exchange rate volatility. Arize (1995) argued that the effect of the exchange rate uncertainty is an empirical issue that is hard to be predetermined. Nevertheless, Broll and Eckwert (1999) presented a channel for the possibility of a positive relationship. Additionally, Nabli and Veganzones-Varoudakis (2004) estimated the exports<sup>6</sup> demand function in a panel data framework for 53 developing countries (including 10 MENA countries) for three consecutive decades 1970s, 1980s and the 1990s. The results showed that the inconsistencies among macro-economic policies would increase the volatility of the RER. In addition, the study concluded that the RER experienced a significant overvaluation in the MENA countries over the three decades; however, volatility appeared to be relatively lower. Moreover, the estimates fail to provide significant insights for the volatility in the relative prices for both manufactured and total exports. Ozkan (2004) found that there is a non-linear relationship, which depends on the interaction with the volatility of the importer country's economic activity.

The second category focuses on the relationship between the exchange rate misalignment and trade. The hypothesis states that overvaluation will adversely affect the degree of competitiveness of a particular economy. All the empirical studies presented are based on the cross-country analysis. Pick and Vollrath (1994) estimated the impact of the exchange rate misalignment on the exports supply of selected products among ten developing countries including Egypt. The main findings of the paper show that because of misalignment, the cotton exports fall in case of Egypt, maize, wheat and meat exports fall in case of Argentina and coffee exports fall in Indonesia. Al-shawarby (1999) in an attempt to forecast the impact of the Egyptian exchange rate on exports using two datasets: annual

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<sup>6</sup> The estimations have been carried twice, once for the total exports and the other for the manufactured exports.

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data sample spanning from 1970 to 1997 and another monthly sample covering the period January 1990 to October 1998. The paper found that the exports had a self-reliant component; in addition, the impulse-response functions showed that the RER movements had minor percentage contributions in the forecasting process. Accordingly, the study concluded that export promotion in Egypt is not entirely an exchange rate problem, but rather more a behavioral and institutional one.

Additionally, Nilsson and Nilsson (2000) and Rajan *et al.* (2004) concluded that the real exchange misalignment had a net negative impact on the developing countries' exports. Bouoiyour (2005) investigated the relationship between the exchange rate misalignment and volatility on Morocco's exports and imports during the period 1960-2000. The main findings of the paper showed that misalignment and volatility measures of the real exchange rate had an adverse impact on the trade balance. Etta-Nkwelle (2007) applied a two-step least squares technique on a panel data of 11 CFA countries, to estimate the effect of the RER overvaluation on the performance of disaggregated exports. The results suggested that the effect of the RER overvaluation rely on the nature and type of the sector under investigation. The study found that both the agriculture and the export sectors were negatively affected from the overvaluation.

### 3. DATA AND METHODOLOGY

The study estimated the impact of the RER misalignment and volatility on the trade performance in Egypt measured by the exports volume covering the period 2001:Q3-2013:Q2. Couple of reasons behind the sample choice: first, misalignment from nominal shocks was not clearly demonstrated before 2001, since then the Central Bank of Egypt intervened by series steps of devaluation in the Egyptian Pound, till the beginning of 2003, when it officially announced a shift into a floating exchange rate regime. Second, maintaining the nominal exchange rate fixed for an extended period has hindered the pass through effect and the relative prices did not change dramatically until the above-mentioned date. Third, the sample choice was motivated by Al-shawarby (1999) empirical evidence, which argued that up to the end of the 90's, the exchange rate movements had a minor contribution in exports forecasts. The last reason was concerned with a statistical issue; most of the national accounts have not been published on quarterly basis before the fiscal year 2001/2002.

Turning to the incorporated variables and the data sources, the analysis utilized quarterly data for the GDP at constant prices, government consumption expenditure, exports, imports, current account inflows, the price indices, international commodity price indices and the nominal exchange rates. All the data series were gathered from the Central Bank of Egypt, International Financial Statistics database (IMF) and the Ministry of Planning and International Cooperation.

#### 3.1. Estimating the REER misalignment

In quantifying the impact of the RER dynamics on the exports volume, RER misalignment and volatility indicator has to be first estimated. In this context, to estimate the RER misalignment, the paper followed Edwards' model (1989) based on a Vector Error-Correction Model (VECM) to estimate the long-term path of the RER as a function of a group of economic fundamentals as illustrated in equation (1)<sup>7</sup>. The technique requires the existence of a co-integrating relationship based on Johansen co-integration test. Noteworthy, if no co-integrating relationship is found, then this implies that the incorporated fundamentals are not the appropriate variables that capture the long-run equilibrium RER, thus in this case variables revision is recommended until the co-integrating relationship is obtained.

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<sup>7</sup> For the variables' definition, refer to the technical notes in the appendix.

$$LREER_t = \alpha_0 + \alpha_1 LGDP_t + \alpha_2 Openness_t + \alpha_3 GovC_t + \alpha_4 TOT_t + \alpha_5 CA Inflows_t + e_t \quad (1)$$

It is noteworthy that the expected signs of the estimated coefficients are settled upon in the empirical literature. The estimated coefficients  $\alpha_1$  (*Balassa-Samuelson Effect*),  $\alpha_4$  and  $\alpha_5$  (*Dutch Disease Effect*) are all expected to have a positive signs, because any improvement in any of these variables will stimulate the demand on the non-tradable goods, resulting in higher domestic prices thus real appreciation. On the contrary, coefficient ( $\alpha_2$ ) is expected to have a negative sign, implying that the higher the degree of openness, the higher the degree of real depreciation because the spending will be diverted to the tradable goods. Finally, the literature argued that the expected sign of government expenditure ( $\alpha_3$ ) might carry either positive or negative sign; the issue depends on the structure of the government expenditure whether it directs its purchases to non-tradables or tradables. Once the equilibrium RER is calculated, the RER misalignment can be easily obtained as the difference between the observed RER and the equilibrium RER. According to the model structure used, any positive (negative) values means overvaluation (undervaluation) in the Egyptian Pound.

## 3.2. Estimating the REER volatility

Practically, it is more preferable to estimate the volatility models with high frequency data to be able to capture more dynamics. In this context, the paper derived volatility within the Real Effective Exchange Rate (REER) using monthly data that covered the period from January, 1999 till June, 2013. The study applies two types of models: univariate ARCH-type models and Stochastic Volatility models, which are based on the Kalman Filter's (KF) recursion algorithm.

The volatility estimation starts by ARCH model proposed by Engle (1982) and Engle (2001) and the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) models to estimate the sources of volatility embedded in the REER series. Both models are considered outstanding tools in capturing the time-varying variance especially in case of financial indicators. Moreover, the GARCH models are capable in dealing with the fat tails and volatility-clustering problems (Ramzan *et al.* 2012).

The ARCH (p) model considers the variance of the current error term (innovation) as a function of the lagged squared error terms (p). The model is formulated by the following: let  $\varepsilon_t$  denote the error term of exchange rate return residuals with respect to mean process and assume that  $\varepsilon_t = \sigma_t z_t$  where  $z_t \sim N(0,1)$  and the series  $\sigma_t^2$  are modeled by:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_p \varepsilon_{t-p}^2 = \alpha_0 + \sum_{i=1}^p \alpha_i \varepsilon_{t-i}^2 \quad (2)$$

The GARCH (p, q) model considers the variance of the current error term (innovation) as a function of lagged squared errors terms (p) and lagged volatility GARCH terms (q). The model is formulated as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_p \varepsilon_{t-p}^2 + \beta_1 \sigma_{t-1}^2 + \dots + \beta_q \sigma_{t-q}^2 = \alpha_0 + \sum_{i=1}^p \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^q \beta_i \sigma_{t-i}^2 \quad (3)$$

In the framework of our empirical analysis, we use a combination of Autoregressive Moving Average (ARMA) and GARCH models for examining the characteristics of the real exchange rate return series. The time-series analysis starts with fitting an ARMA (p, q) model to the real exchange rate return series then examining the behavior of the error term. The general form is given by the following ARMA (p, q) model:

$$Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + \dots + \phi_p Y_{t-p} + u_t + \theta_1 u_{t-1} + \theta_2 u_{t-2} + \dots + \theta_q u_{t-q} \quad (4)$$

Where  $Y_t$  is the series of interest and  $u_t$  is a Gaussian (white noise) error term, it is common to find financial time series lacking the characteristic of being stationary. The need to work on a stationary time series necessitates checks through the unit root tests.

The order (p, q) of an ARMA model will depend on the frequency of the exchange rate return series. This can be decided through analyzing the Auto-Correlation Function (ACF) and the Partial Auto-Correlation Function (PACF) (Asteriou and Stephen, 2007). After checking for stationarity and conducting the ARMA model, it becomes necessary to examine the volatility of the exchange rate return series using an ARCH-GARCH framework.

As for the *second* set of models, contrary to the traditional ARCH and GARCH models that depend chiefly on past returns to model volatility, the SS models fit more naturally to data since they utilize market news or information flows into the estimation process. The state space representation of the linear dynamic system, based on Hamilton (1994), given by the following first-order autoregression model:

$$y_{t+1} = \phi y_t + \varepsilon_{t+1}, \varepsilon_t \sim \text{i.i.d } N(0, \sigma^2) \quad (5)$$

As such, the future values of (y) for the above process depend on its lagged values only through the current value ( $y_t$ ). This facilitates the dynamics analysis of the system and the forecasting process. Moreover, equation (4) can be easily solved by recursive substitution:

$$y_{t+m} = \phi^m y_t + \phi^{m-1} \varepsilon_{t+1} + \phi^{m-2} \varepsilon_{t+2} + \dots + \phi^1 \varepsilon_{t+m-1} + \varepsilon_{t+m}, \text{ for } m = 1, 2, \dots \quad (6)$$

The process is said to be stable if  $|\phi| < 1$ . The intuition behind the state space models is to capture the dynamics of the observed component or the signal ( $y_t$ ) (real exchange rate) in terms of a possibly unobserved state vector ( $h_t$ ). The dynamics of the state vector ( $h_t$ ) are taken to be a vector generalization of equation (5):

$$h_{t+1} = F h_t + v_{t+1}, v_t \sim \text{i.i.d } N(0, Q) \quad (7)$$

In this regard, the paper applied an approximate Kalman filter using Quasi Maximum Likelihood (QML) estimation technique. The following state-space form was adopted for implementing the log volatility SV model:

**Signal (Observation) Equation:**  $\log y_t^2 = h_t + \log \varepsilon_t^2 \Rightarrow \log y_t^2 = -1.2704 + h_t + \tau_t$

Where ( $\varepsilon_t$ ) has a standard normal distribution, and the ( $\log \varepsilon_t^2$ ) has a log-chi-square distributions with mean approximately equals -1.2704 and variance  $\pi^2 / 2$

**State Equation:**  $h_t = \mu + \Phi h_{t-1} + \eta_t$ ; where  $\eta_t$  is i.i.d  $N(0, \sigma_\eta^2)$

Thus we denote ( $\mathbf{Y}$ ) as the vector of  $T$  consecutive observations, ( $\mathbf{h}$ ) is the vector of the corresponding log-volatilities and ( $\boldsymbol{\theta}$ ) = ( $\mu, \Phi, \sigma_\eta^2$ ) is the vector of hyper-parameters.

### 3.3. Estimating the effects of REER dynamics on exports flows

Turning to the estimation of the effects of RER dynamics on the export flows in Egypt, the proposed methodology will be based on the dynamic specification of the possible existence of error-correcting mechanisms in the data as illustrated in Chowdhury (1993). Practically, before the Error-Correction Model (ECM) is applied, unit root test based on the Augmented Dickey Fuller (ADF) test is carried out to test for non-stationarity in each variable (table.2 in the appendix). Following Chowdhury (1993), the ECM technique based on the two-step Engle Granger approach (1987) was estimated twice: once by including a measure for the RER misalignment and the other time incorporating the RER volatility measure. According to that approach, the first step estimates the equilibrium relationship that is prevailing in the

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long-run between the dependent variable real exports (X) and a group of explanatory variables, namely; the level of real activity in the partner countries (Y), competitiveness (P) and real exchange rate misalignment or volatility measure (MIS) or (VOL), as illustrated in equation (8). The expected long-run coefficients' signs are very intuitive;  $\beta_1$  has a positive sign, while  $\beta_2$  and  $\beta_3$  have negative signs. The sign of  $\beta_3$  is the main concern of the study, in terms of signs and magnitudes.

$$\ln X_t = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln P_t + \beta_3 \text{MIS}_t \text{ or } (\text{Vol}_t) + v_t \quad (8)$$

As for the second step, it is concerned with estimating the short-run dynamics after incorporating the feedback term from the long run relationship (Brooks, 2002). The short-term dynamics equation converges into long-run relationship as long as the error correction term has a negative sign and statistically significant, the ECM is represented by equation (9):

$$\Delta \ln X_t = \phi_0 + \phi_1 EC_{t-1} + \sum \alpha_i \Delta \ln Y_{t-i} + \sum \beta_i \Delta \ln P_{t-i} + \sum \theta_i \Delta \ln \text{MIS}_{t-i} \text{ or } (\text{Vol}_{t-i}) + e_t \quad (9)$$

### 4. EMPIRICAL FINDINGS AND RESULTS

This section presents the empirical results and findings of the study. It is organized as follows: the first sub-section presents the co-integrating vector, which represents the long-run path of the RER with the economic fundamentals. This will be followed by the derived misalignment measure induced as the deviation of the observed REER from its equilibrium level. Whereas, the second sub-section displays the different volatility measures based on both the ARCH-type model and SV model. Finally, the section will end up by showing the estimated results after the inclusion of these RER measures in the export supply function.

#### 4.1. REER misalignment measure

Methodologically, the REER estimation is conducted through two main steps. First, the long run coefficients are obtained from a reduced-form equation based on a Vector Error Correction Model (VECM), with two exogenous dummies (one for the floated exchange rate which took place in 2003:Q1 and the other dummy to control for the domestic political shock which took place since the beginning of 2011). The lag length is determined based on Schwartz information criterion, showing one lag in difference (table.3 in the appendix). In this context, the included variables are introduced to the estimation process without any adjustments (i.e. transitory and the permanent components are maintained). Afterwards, the estimated long run coefficients for all variables were used to calculate the REER after filtering the original variables by excluding the transitory components; using a smoothing technique; the paper relies on Hodrick-Prescott (HP) Filter.

According to this specification, the Johansen co-integration test was employed wherein both the Trace Statistics and the Maximum Eigen Value indicated the existence of two co-integrating equations at 95% and 99% confidence levels among the selected variables; implying the stability of the equilibrium relationship. Since the restrictions on the estimated parameters ( $\beta$ ) should be captured from the economic theory; nevertheless, the theory did not tackle that issue. In addition, estimating more than one co-integrating vector will complicate the economic interpretation of the long-run relationship between the REER and the economic fundamentals. Therefore, the paper relied on the long run estimates of one co-integrating equation without imposing any restrictions to estimate the two co-integrating equations. The long run estimated coefficients appear to be consistent with the economic theory concerning their signs (table.4 in the appendix), the estimated long run equilibrium and short run dynamics estimates are given by the following equation:



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$$\Delta(\text{LREER}) = 0.02(\text{LREER}(-1) - 0.49\text{LGDP}(-1) - 0.35\text{LTOT}(-1) + 0.18\text{GOVC}(-1) + 0.02\text{OPEN}(-1) - 0.03\text{EXOG}(-1) - 2.77) + 0.44\Delta(\text{LREER}(-1)) + 0.045\Delta(\text{LGDP}(-1)) + 0.10\Delta(\text{LTOT}(-1)) - 0.00\Delta(\text{GOVC}(-1)) + 0.00\Delta(\text{OPEN}(-1)) - 0.00\Delta(\text{EXOG}(-1)) + 0.01 - 0.24\text{DUMMY\_EX} - 0.01*\text{DUMMY\_REV} \quad (10)$$

where

LREER: logarithm of the observed real effective exchange rate

OPEN: refers to the degree of openness, sum of total trade relative to GDP

LTOT: logarithm of the terms of trade

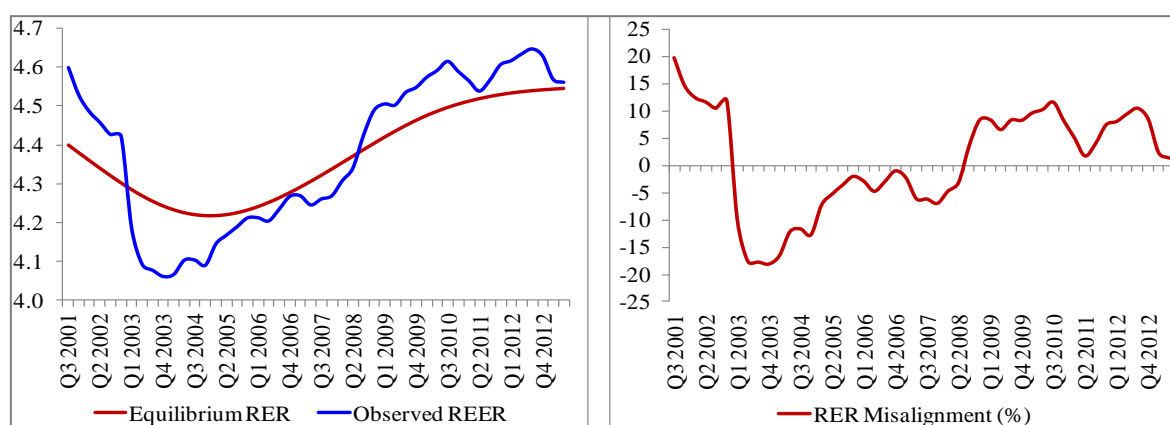
EXOG: exogenous current account inflows of the Suez Canal receipts and tourism receipts and unrequited transfers, to GDP ratio

GOVC: government expenditure to GDP ratio

LGDP: logarithm of the Egypt's GDP per capita relative to that of the main trading partners, a proxy for the productivity differential

DUM\_EX: dummy variable for the shift of exchange rate regime from fixed to float in 2003

DUM\_REV: dummy variable for the incidence of the revolution in the beginning of 2011



**Figure 1: Estimates for equilibrium REER and misalignment measure**

**Source:** Author's estimates. Data obtained from IMF, IFS, on-line elibrary, accessed on December, 2013. Central Bank of Egypt (CBE) and the Ministry of Planning and Economic Cooperation.

Additionally, to estimate the Equilibrium RER (ERER) and then get a measure for the RER misalignment, the literature suggests a smoothing technique to exclude the transitory effects embedded in the economic fundamentals as long as the ERER is a long-run phenomenon. In this context, HP filter is utilized to capture the persistent component in each variable. Subsequently, the estimated long run coefficients were applied to the new time series. The results in Figure 1 show that the Egyptian RER has experienced two overvaluation episodes: the first was spanning from 2001 till the announcement of the exchange rate flotation in 2003, driven by the nominal exchange rate. Whereas the second episode of overvaluation has been experienced recently since the beginning of 2008, attributed to the price differentials in favor of Egypt's trading partners. On the other hand, the period between 2003 and 2008, the RER has witnessed substantial undervaluation that was fortunately accompanied by favorable current account balances.

## 4.2. REER volatility measure

This section starts by presenting the volatility measure that was captured from the ARCH-type models followed by the log volatility measure obtained from the state space model. The descriptive statistics of the real exchange rate return series is presented in Table 1. The volatility was derived from 173 observations starting from February 1999 and ending in June 2013. The mean of the returns series was close to zero while the standard deviation is

roughly 2.5 reflecting the high fluctuations in the series. As for the skewness, it indicated that the variable was skewed to the left and that it is far from being symmetric. In addition, the Kurtosis statistic reflected the leptokurtic feature of the series (high peak or fat-tailed). The Jarque-Bera test indicated that the series was not normally distributed. Therefore, the real exchange rate data showed volatility clustering with fat tails. As such to gain efficiency in estimation, the existing ARCH/GARCH effect in data should be properly examined and modeled via formal tests.

**Table 1: Descriptive statistics of real exchange rate return (DLREER) series**

Statistic	Value	Statistic	Value	Statistic	Value
Mean	-0.03	Std. Dev.	2.47	Jarque-Bera	3915.15
Median	0.19	Skewness	-3.04	Probability	0.00
Maximum	7.87	Minimum	-19.54	Kurtosis	25.50

### 4.2.1. REER volatility: ARCH-type models

The analysis started with the preliminary checks for the stationarity of the exchange rate series. Thus, the Augmented Dickey-Fuller (ADF) test was utilized to decide on the degree of integration of the series. The ADF-statistics indicated the fail to reject that null hypothesis of unit root in the exchange rate series; implying that the series is non-stationary at level. Conducting the same test on the return series turned it to be stationary at all confidence levels.

Looking into the autocorrelation function and partial autocorrelation function of the return series, suggested a model specification of ARMA ( $p=1$ ,  $q=1$ ) with a dummy for exchange rate regime shift in 2003. The ACF and PACF of the residuals squared were examined and they indicated that the estimated errors were heteroscedastic at 10 percent. This was concluded despite that Lagrange Multiplier ARCH test failed to reject the null hypothesis of no ARCH effect in errors. Against this background, two GARCH model specifications were carried out, because the AR(1) and MA(1) estimated coefficients in the mean equation in the first model appeared statistically insignificant, thus, another GARCH model was estimated after their exclusion, without affecting the results. The estimated volatility measures displayed in Figure 2 are given by the following two models:

*GARCH: Model (1):*

Mean Equation:  $DLREER = -17.89DUMMY + 0.11 + [AR(1) = 0.18, MA(1) = 0.11]$

Variance Equation:  $\sigma^2 = 1.08 + 0.35 \varepsilon_{(-1)}^2 + 0.42 \sigma_{(-1)}^2$

*GARCH: Model (2):*

Mean Equation:  $DLREER = -21.02DUMMY + 0.18$

Variance Equation:  $\sigma^2 = 1.15 + 0.33 \varepsilon_{(-1)}^2 + 0.43 \sigma_{(-1)}^2$

As per the consistency checks, the estimates are in line with the econometric literature, since the mean-reverting variance process of the estimated equation is achieved, in the sense that the coefficients of the variance equation sum up to less than one (around 0.76). This conclusion implies that there existed moderate persistency in the volatility of the real exchange rate return series, i.e. the shocks in the exchange rate returns die relatively slowly. Additionally, the autocorrelation function and partial autocorrelation function of the residuals squared show that the GARCH (1, 1) model was able to capture the volatility embedded in the REER series.

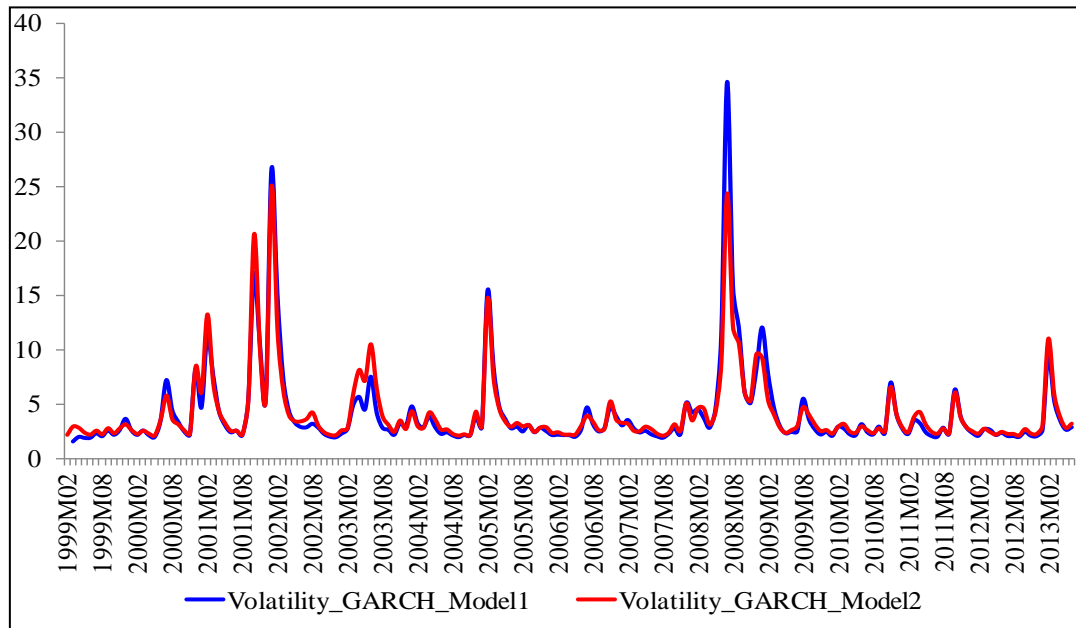


Figure 2: Estimated volatility based on ARCH-type models

#### 4.2.2. REER volatility: Stochastic volatility (SV) model

The state space- type models were used to capture the unobserved (latent) time-varying variance (state component) from the observed observations (signal component). In doing so, the paper applied an approximate Kalman filter using Quasi Maximum Likelihood (QML) estimation technique. The following state-space form was adopted on the log- squared returns of the REER based on the SV model:

$$\text{Signal (Observation) Equation: } \log DLREER_t^2 = h_t + \log \varepsilon_t^2 \Rightarrow \log DLREER_t^2 = -1.27 + h_t + \tau_t$$

$$\text{State Equation: } h_t = \mu + \Phi h_{t-1} + \eta_t ; \text{ where } \eta_t \text{ is i.i.d. } \sim N(0, \sigma_\eta^2)$$

Applying the above model structure, it is observed that the vector of the hyper-parameters ( $\theta$ ) =  $(\mu, \Phi, \sigma_\eta^2)$  included statistically insignificant estimates for the three parameters. This result is very intuitive because the SS models are a good tool for measuring market expectations and reactions to news either those related to the market itself or the conduct of new policies and/or interventions. Since the Central Bank of Egypt used to intervene in the foreign exchange market, especially during the crises episodes<sup>8</sup>, to maintain its stability and to manage the news which flow into the FOREX market. In doing so, it succeeded in preventing the emergence of parallel markets. Historically, this happened because during unstable times, the economic agents rush into the speculation on the FOREX market to maximize their gains from uncertainties surrounding the whole economy.

#### 4.3. Effects of REER dynamics on exports flows

Turning to the estimation of the impact of the REER dynamics, i.e. misalignment and volatility on exports flows in Egypt, as mentioned above, the applied methodology relied upon the dynamic specification of the possible existence of error-correcting mechanisms in the data as illustrated in Chowdhury (1993). Methodologically, unit root test based on the Augmented Dickey Fuller (ADF) test was carried out and it showed that all the incorporated variables

<sup>8</sup> The data sample enclosed unstable periods due to the occurrence of an external shock in 2008 because of the spillover effects of the Global Financial Crisis, in addition to the internal shock which took place in 2011, on the back of the political transition.

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failed to reject the null hypothesis of unit root in the each variable at 1 percent significance level. The ECM based on the two-step Engle Granger approach (1987) was employed twice, to derive the dynamic relationship between the exports volume and REER misalignment on one hand. Meanwhile, another ECM model was estimated to depict long and short-run relationship between the exports volume and the estimated volatility measure from the GARCH model. Practically, the first step in that technique estimated the equilibrium relationship that is prevailing in the long run between the dependent variable real exports and a group of explanatory variables; among which the REER dynamics measure. The ECM models were estimated after testing that the feedback terms (residuals) from the long run equations were free from non-stationarity based on the critical values of Engle and Granger Co-integration test (see tables. 9 and 10 in the appendix).

The empirical results showed that no contemporaneous long-run relationship existed between the quantity of exports and either the REER misalignment or the REER volatility. Rather, the study found that instead a long-run path of exports was affected with a lag of four quarters in the misalignment proxy with no evidence from the volatility measure. The estimates indicated that exports were adversely affected by almost half the magnitude of misalignment. This finding is economically intuitive, because it is difficult for the exports to respond instantly to the dynamics that is taking place in the FOREX market, since this is considered as an institutional and structural issue that needs sometime for adjustment within the exports sector (see tables. 5 through 8 and tables. 11 & 12 in the appendix).

### ***Long-run Equation for the REER Misalignment:***

$$LX_t = 0.91LY_t^* - 0.48MIS_{t-4}^* + 0.20P_t - 0.29DUMMY\_REV_t^* - 8.40^* \\ R^2 = 0.74, \text{ Durbin-Watson (D.W)} = 1.44, \text{ ADF-Statistics (Residuals)} = -4.85^{***}$$

### ***ECM Equation for the REER Misalignment:***

$$\Delta (LX_t) = -0.24 \Delta (LX_{t-1}) - 1.15 \Delta (LY_{t-1})^* - 0.65 \Delta (MIS_{t-4})^* - 1.77 \Delta (LP_{t-2})^* - 0.36 ECM_{t-1}^{**} \\ - 0.05 DUMMY\_REV_t + 0.05^* \\ R^2 = 0.47, \text{ Durbin-Watson (D.W)} = 1.99$$

### ***Long-run Equation for the REER Volatility:***

$$LX_t = 1.17 LY_t^* - 0.00VOL_{t-4} + 0.09P_t - 0.31DUMMY\_REV_t^* - 9.07^* \\ R^2 = 0.70, \text{ Durbin-Watson (D.W)} = 1.33, \text{ ADF-Statistics (Residuals)} = -4.64^{***}$$

### ***ECM Equation for the REER Volatility:***

$$\Delta (LX_t) = -0.17 \Delta (LX_{t-1}) - 1.10 \Delta (LY_{t-1})^* - 0.00 \Delta (VOL_{t-4}) - 1.85 \Delta (LP_{t-2})^* - 0.41 ECM_{t-1}^* \\ - 0.05 DUMMY\_REV_t + 0.05^* \\ R^2 = 0.42, \text{ Durbin-Watson (D.W)} = 1.94$$

Where \* indicates that the estimated parameter is statistically significant at 5 percent, \*\* indicates that the estimated parameter is statistically significant at 10 percent, \*\*\* Critical values for the Engle-Granger Co-integration test for five variables are -5.416, -4.700 and -4.348 at significance levels of 1%, 5% and 10%, respectively.

Moreover, estimated results for both the misalignment and volatility proxies reflected that on average the demand on exports were affected just proportionately with the economic activity within the economies of Egypt's main trading partners. Whereas, the inflation differential variable although, having the right negative sign, yet it is statistically insignificant. Moreover, the estimated ECM equations showed that the speed of adjustment in case of misalignment deviation is slower than in case of deviation volatility. The adjustment term was quantified to

be 0.35 and 0.41, respectively. In other words, the economy needed about three quarters to restore back full equilibrium from REER misalignment; however, it restore back equilibrium a bit faster in case of deviation due to REER volatility, which counted for a period of 2.5 quarters.

### 5. CONCLUSIONS AND POLICY RECOMMENDATIONS

The aim of the study was to quantify the impact of REER misalignment and volatility on the exports performance in Egypt covering the period 2001:Q3 to 2013:Q2, while taking into account the structural breaks and shocks that took place during the period under investigation. The study worked on estimating a formal proxy for REER misalignment and REER volatility, based on structural models that both the theoretical and empirical literature have consensus.

While modeling REER volatility, as per GARCH estimates, the empirical results indicated that the mean-reverting variance process of the estimated equation is achieved, in the sense that the coefficients of the variance equation sum up to less than one (around 0.76). This conclusion implies that there existed moderate persistency in the volatility of the real exchange rate return series, i.e. the shocks in the exchange rate returns die relatively slowly. Additionally, the autocorrelation function and partial autocorrelation function of the residuals squared showed that the GARCH (1, 1) model was able to capture the volatility embedded in the REER series. On the contrary, the Stochastic Volatility model, which estimated the time-varying variance as a latent or unobserved component, although the econometric theory argues that it fits more naturally into the data, it failed to model REER volatility dynamics and the market expectations, and the model was statistically insignificant altogether. This was justified by the fact that the CBE was controlling the FOREX market such that the news were not flowing normally into the market, this happened because the CBE worked on preventing the re-emergence of the parallel markets again after it was completely abolished by the end of 2004.

Turning to the REER misalignment's estimation, it has been found that the results came in line with the early empirical efforts by the IMF and others, despite the fact that the magnitudes of REER deviation from its long run path were not roughly the same. Therefore, as a stylized fact, the magnitude of REER misalignment is sensitive to the applied methodology, the time span of estimation, and finally to the incorporated economic fundamentals used to find out the Equilibrium real exchange rate at a particular point in time. Per se, an adequate specification of the incorporated fundamentals, which suit each economic setup and episode, is considered as a crucial issue in estimating the misalignment in a proper way before drawing out conclusions and recommendations.

In spite that the empirical results indicated that during over-valuation episodes, the REER misalignment did not exceed 10 percent on average during the period under investigation; yet it has been concluded that misalignment had an adverse impact on export volume flows. The impact occurred with a lag effect of one full year and with an average magnitude of about 0.5 percent decline in exports volume association of 1 percent overvaluation in REER. Moreover, being a small open economy, Egypt appeared relatively vulnerable and it acted as a price taker to international commodity prices in determining the development in its terms of trade. This justifies why the estimation failed to find a long-run relationship between inflation differential and the exports volume. Additionally, the Egyptian exports responded just proportionately on average to the economic activity and growth within the economies of its main trading partners. Finally, the impact of the revolution, which took place since early 2011 with its spillovers remaining within the economy, indicated that exports were negatively influenced by such instability by an estimated elasticity equals to 0.3.

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To sum up, it is recommended that the CBE should start working on the gradual adjustment of the deviation in the REER from its long-run path, to bring the REER to the level that is in line with its economic fundamentals and setup. As such, the macroeconomic stability will be achieved and maintained. In doing so, the market will be gradually educated and adapted to the new exchange rate policy, in the sense that distortions will vanish bit by bit and the market news will flow in a smooth way among the market participants.

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## STATISTICAL APPENDIX

### Some Technical Notes:

The Real Effective Exchange Rate (REER) is calculated a geometric mean using the following formula, by incorporating seven trading partners; which constitutes around 69% of Egypt's total trade with the world (CBE). These partners are Euro-Area (26%), United States (21%), United Kingdom (7%), Switzerland (5%), China (4%), India (3%) and Japan (3%). Nevertheless, few adjustments have to be introduced to let the sum of these shares yield one. The standardized shares are Euro-Area (37%), United States (30%), United Kingdom (10%), Switzerland (8%), China (6%), India (5%) and Japan (4%).

$$REER_{jt} = \Pi_i \left[ \left( \frac{e_{it}}{e_{io}} \right) * \left( \frac{P_{jt}}{P_{it}} \right) \right]^{W_i} * 100$$

where:

$\Pi_i$  = multiplication of Egyptian exchange rate against trade partner countries' currencies change indices, corrected for relative prices taking into account normalized weight of a country in the total country group commodity trade ( $W_i$ ).

$e_{it}$  = foreign exchange rate of country (i) in terms of the domestic currency in the period (t).

$e_{io}$  = foreign exchange rate of country (i) in terms of the domestic currency in the base period (0).

$P_{jt}$  = domestic inflation rate in the period (t).

$P_{it}$  = trade partner country (i)'s inflation rate in the period (t).

Variables definitions of equation (1): **LREER** is the logarithm of real effective exchange rate measured as a basket of currencies weighted by the corresponding trade shares. **LGDP** is the logarithm of the relative GDP per capita in Egypt to that of the largest three trading partners (Euro-Area, United States and United Kingdom); this indicator was used as a proxy for the productivity differential between Egypt and its main trading partners. **Openness** is a proxy for the degree of Egypt's trade openness and it was calculated as the sum of total exports and imports to GDP. **GovC** is the government expenditure to GDP ratio. **TOT** is the terms of trade, calculated as a ratio between Egypt's exports unit value to its imports unit value. **CA Inflows** are the exogenous current account inflows of the Suez Canal receipts, tourism receipts, workers' remittances and the official grants, as a ratio of GDP, and  $e_t$  is an i.i.d. error term.

In estimating equation (8), **L(Y<sub>t</sub>)** stands for the external demand on the domestic exports, it is calculated as a weighted average of the partners' GDP weighted by the corresponding trade shares. As for **L(P<sub>t</sub>)**, it is a competitiveness measure, and it is calculated as the relative price between the domestic price level and the partner's prices.

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**Table 2: Augmented Dickey Fuller unit root test results**

	Level	Lag Length (Modified SIC)	Test critical values (5%)	Test critical values (10%)
LREER	-3.42059	0	-3.50851	-3.18423
LGDP	-2.5579	0	-3.50851	-3.18423
LTOT	-2.85732	0	-3.50851	-3.18423
EXOG	-2.79982	1	-3.51074	-3.18551
GOVC	-0.16976	3	-3.51552	-3.18826
OPEN	-1.9828	6	-3.52362	-3.1929
LX	-0.66826	3	-3.51552	-3.18826
LY	-1.59239	0	-3.50851	-3.18423
LP	-2.45844	0	-3.50851	-3.18423
MIS	-2.86079	0	-3.50851	-3.18423
VOL	-3.97605	1	-3.51074	-3.18551

**Table 3: VAR lag order selection criteria**

Endogenous variables: LREER LGDP LTOT GOVC OPEN EXOG

Exogenous variables: C DUMMY\_EX DUMMY\_REV

Sample: 2001Q3 2013Q2

Included observations: 44

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-82.58	NA	0.00	4.57	5.30	4.84
1	84.31	265.51	0.00	-1.38	0.81*	-0.57
2	131.10	61.68	0.00	-1.87	1.78	-0.51
3	193.25	64.98	0.00	-3.06	2.05	-1.16
4	278.63	65.98*	0.00*	-5.30*	1.27	-2.87*

**Note:** \* indicates the lag length selected by the criterion at 5% level

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**Table 4: Vector error correction estimates for REER**

Sample (adjusted): 2002Q1 2013Q2						
Included observations: 46 after adjustments						
t-statistics in squared parentheses						
Co-integrating Equation (coefficients are reported in the reduced form)						
LGDP(-1)	-0.49 [-3.63]	LTOT(-1)	-0.35 [-2.59]	GOVC(-1)	0.18 [ 12.77]	
OPEN(-1)	0.02 [ 6.49]	EXOG(-1)	-0.03 [-2.64]	C	-2.77	
Error Correction:	$\Delta(\text{LREER})$	$\Delta(\text{LGDP})$	$\Delta(\text{LTOT})$	$\Delta(\text{GOVC})$	$\Delta(\text{OPEN})$	$\Delta(\text{EXOG})$
CointEq1	0.02 [ 0.36]	0.04 [ 0.43]	-0.01 [-0.04]	-6.83 [-4.07]	-30.68 [-4.52]	-4.59 [-1.59]
$\Delta(\text{LREER}(-1))$	0.44 [ 2.86]	0.56 [ 2.43]	-0.18 [-0.50]	-8.29 [-1.80]	-20.07 [-1.08]	-4.02 [-0.51]
$\Delta(\text{LGDP}(-1))$	0.04 [ 0.31]	-0.15 [-0.67]	0.12 [ 0.35]	6.21 [ 1.43]	-1.87 [-0.11]	-7.19 [-0.96]
$\Delta(\text{LTOT}(-1))$	0.10 [ 1.46]	0.03 [ 0.28]	0.11 [ 0.64]	-0.16 [-0.08]	7.12 [ 0.81]	-2.07 [-0.55]
$\Delta(\text{GOVC}(-1))$	0.00 [-0.04]	0.00 [-0.24]	-0.01 [-0.74]	0.41 [ 1.71]	0.99 [ 1.02]	0.69 [ 1.66]
$\Delta(\text{OPEN}(-1))$	0.00 [ 1.38]	0.00 [ 0.81]	0.00 [ 0.65]	0.01 [ 0.32]	-0.47 [-4.16]	0.03 [ 0.64]
$\Delta(\text{EXOG}(-1))$	0.00 [-0.52]	0.00 [-0.89]	0.01 [ 0.75]	-0.19 [-2.06]	0.11 [ 0.29]	-0.44 [-2.72]
C	0.01 [ 1.97]	0.00 [-0.36]	0.01 [ 0.69]	-0.05 [-0.37]	-0.04 [-0.08]	0.07 [ 0.30]
DUMMY_EX	-0.24 [-9.55]	-0.21 [-5.45]	0.01 [ 0.11]	0.94 [ 1.22]	0.02 [ 0.01]	-0.13 [-0.10]
DUMMY_REV	-0.01 [-1.19]	-0.01 [-0.93]	0.00 [ 0.10]	0.65 [ 2.33]	1.03 [ 0.91]	-0.04 [-0.07]
R-squared	0.80	0.58	0.07	0.51	0.64	0.34
Adj. R-squared	0.74	0.47	-0.17	0.39	0.55	0.17
Sum sq. resids	0.02	0.05	0.12	19.34	316.30	57.45
S.E. equation	0.02	0.04	0.06	0.73	2.96	1.26
F-statistic	15.54	5.42	0.29	4.15	7.18	2.02
Log likelihood	111.55	92.53	71.13	-45.35	-109.62	-70.38
Akaike AIC	-4.42	-3.59	-2.66	2.41	5.20	3.49
Schwarz SC	-4.02	-3.19	-2.26	2.80	5.60	3.89
Mean dependent	0.00	-0.01	0.01	0.04	0.15	0.07
S.D. dependent	0.05	0.05	0.05	0.94	4.43	1.39

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**Table 5: Long-run equation exports volume (1): REER misalignment**

Method: Least Squares				
Sample: 2001Q3 2013Q2				
Included observations: 48				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LY	1.25	0.25	4.96	0.00
MIS	0.30	0.23	1.32	0.19
LP	-0.06	0.17	-0.35	0.73
DUMMY_REV	-0.27	0.06	-4.67	0.00
C	-8.70	0.63	-13.91	0.00
R-squared	0.72	Mean dependent var	-3.27	
Adjusted R-squared	0.69	S.D. dependent var	0.17	
S.E. of regression	0.10	Akaike info criterion	-1.76	
Sum squared resid	0.39	Schwarz criterion	-1.57	
Log likelihood	47.26	F-statistic	27.01	
Durbin-Watson stat	1.43	Prob(F-statistic)	0.00	

**Table 6: Long-run equation exports volume (2): REER misalignment**

Method: Least Squares				
Sample (adjusted): 2002Q3 2013Q2				
Included observations: 44 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LY	0.91	0.24	3.77	0.00
MIS(-4)	-0.48	0.17	-2.83	0.01
LP	0.20	0.12	1.66	0.10
DUMMY_REV	-0.29	0.05	-5.80	0.00
C	-8.40	0.83	-10.16	0.00
R-squared	0.74	Mean dependent var	-3.25	
Adjusted R-squared	0.72	S.D. dependent var	0.17	
S.E. of regression	0.09	Akaike info criterion	-1.90	
Sum squared resid	0.31	Schwarz criterion	-1.70	
Log likelihood	46.77	F-statistic	28.32	
Durbin-Watson stat	1.44	Prob(F-statistic)	0.00	

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**Table 7: Long-run equation exports volume (1): REER volatility**

Method: Least Squares				
Sample: 2001Q3 2013Q2				
Included observations: 48				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LY	1.03	0.18	5.72	0.00
VOL	0.00	0.00	0.68	0.50
LP	0.09	0.12	0.79	0.43
DUMMY_REV	-0.30	0.05	-5.41	0.00
C	-8.46	0.60	-14.17	0.00
R-squared	0.71	Mean dependent var	-3.27	
Adjusted R-squared	0.68	S.D. dependent var	0.17	
S.E. of regression	0.10	Akaike info criterion	-1.73	
Sum squared resid	0.40	Schwarz criterion	-1.54	
Log likelihood	46.56	F-statistic	25.93	
Durbin-Watson stat	1.30	Prob(F-statistic)	0.00	

**Table 8: Long-run equation exports volume (2): REER volatility**

Method: Least Squares				
Sample (adjusted): 2002Q3 2013Q2				
Included observations: 44 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LY	1.17	0.24	4.80	0.00
VOL(-4)	0.00	0.00	-0.93	0.36
LP	0.09	0.12	0.76	0.45
DUMMY_REV	-0.31	0.06	-5.53	0.00
C	-9.07	0.86	-10.50	0.00
R-squared	0.70	Mean dependent var	-3.25	
Adjusted R-squared	0.67	S.D. dependent var	0.17	
S.E. of regression	0.10	Akaike info criterion	-1.73	
Sum squared resid	0.36	Schwarz criterion	-1.53	
Log likelihood	43.15	F-statistic	22.55	
Durbin-Watson stat	1.33	Prob(F-statistic)	0.00	

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**Table 9: Augmented Dickey-Fuller test for misalignment residuals**

Null Hypothesis: ECM_MIS has a unit root				
Lag Length: 0 (Automatic based on Modified SIC, MAXLAG=9)				
with intercept and trend			t-Statistic	Prob.
Augmented Dickey-Fuller test statistic			-4.74*	0.00
Test critical values:	1% level			-4.19
	5% level			-3.52
	10% level			-3.19
ECM_MIS(-1)	-0.72	0.15	-4.74	0.00
C	-0.01	0.03	-0.22	0.83
@TREND(2001Q3)	0.00	0.00	0.23	0.82
without intercept and trend			t-Statistic	Prob.
Augmented Dickey-Fuller test statistic			-4.85*	0.00
Test critical values:	1% level			-2.62
	5% level			-1.95
	10% level			-1.61
ECM_MIS(-1)	-0.72	0.15	-4.85	0.00

**Table 10: Augmented Dickey-Fuller test for volatility residuals**

Null Hypothesis: ECM_VOL has a unit root				
Lag Length: 0 (Automatic based on Modified SIC, MAXLAG=9)				
with intercept and trend			t-Statistic	Prob.
Augmented Dickey-Fuller test statistic			-4.52*	0.00
Test critical values:	1% level			-4.19
	5% level			-3.52
	10% level			-3.19
ECM_VOL (-1)	-0.67	0.15	-4.52	0.00
C	0.00	0.03	0.06	0.95
@TREND(2001Q3)	0.00	0.00	-0.02	0.98
without intercept and trend			t-Statistic	Prob.
Augmented Dickey-Fuller test statistic			-4.64*	0.00
Test critical values:	1% level			-2.62
	5% level			-1.95
	10% level			-1.61
ECM_VOL(-1)	-0.67	0.15	-4.64	0.00

**Note:** The decision taken on the ADF test statistics were based on the critical values obtained from Engle and Granger tables of Co-integration test for five variables are -5.416, -4.700 and -4.348 at significance levels of 1%, 5% and 10%, respectively.

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**Table 11: Error correction model for exports volume: REER misalignment**

Dependent Variable: $\Delta(LX)$				
Method: Least Squares				
Sample (adjusted): 2002Q4 2013Q2				
Included observations: 43 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta(LX(-1))$	-0.24	0.16	-1.50	0.14
$\Delta(LY(-1))$	-1.15	0.46	-2.51	0.02
$\Delta(MIS(-4))$	-0.65	0.31	-2.11	0.04
$\Delta(LP(-2))$	-1.77	0.65	-2.71	0.01
ECM_MIS(-1)	-0.36	0.20	-1.79	0.08
DUMMY_REV	-0.05	0.03	-1.55	0.13
C	0.05	0.02	2.61	0.01
R-squared	0.47	Mean dependent var	0.00	
Adjusted R-squared	0.38	S.D. dependent var	0.10	
S.E. of regression	0.08	Akaike info criterion	-2.07	
Sum squared resid	0.23	Schwarz criterion	-1.78	
Log likelihood	51.52	F-statistic	5.25	
Durbin-Watson stat	1.99	Prob(F-statistic)	0.00	

**Table 12: Error correction model for exports volume: REER volatility**

Dependent Variable: $\Delta(LX)$				
Method: Least Squares				
Sample (adjusted): 2002Q4 2013Q2				
Included observations: 43 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
$\Delta(LX(-1))$	-0.17	0.16	-1.07	0.29
$\Delta(LY(-1))$	-1.10	0.47	-2.33	0.03
$\Delta(VOL(-4))$	0.00	0.00	-1.52	0.14
$\Delta(LP(-2))$	-1.85	0.67	-2.75	0.01
ECM_VOL(-1)	-0.41	0.18	-2.30	0.03
DUMMY_REV	-0.05	0.03	-1.58	0.12
C	0.05	0.02	2.66	0.01
R-squared	0.42	Mean dependent var	0.00	
Adjusted R-squared	0.33	S.D. dependent var	0.10	
S.E. of regression	0.08	Akaike info criterion	-1.99	
Sum squared resid	0.25	Schwarz criterion	-1.71	
Log likelihood	49.83	F-statistic	4.40	
Durbin-Watson stat	1.94	Prob(F-statistic)	0.00	



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# DETERMINANTS OF CAPITAL STRUCTURE IN OMANI SERVICES SECTOR

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**Abstract:** This study examines some determinants of capital structure (leverage) in a sample of the Omani Services companies (tourism and energy sectors) listed on Muscat Securities Market. According to available information, the determinants are size of the company measured by natural logarithm of total assets, rate of growth measured by market- book value ratio (P/E), profitability measured by return on assets (ROA) and risk measured by standard deviation of return on assets. The study attempts to answer the following question: what are determinants of capital structure (leverage) in Omani services Companies? The study tests two hypotheses in each sector. The first hypothesis tests the associations between the independent variables and dependent variable. The second one tests the impacts of independent variables on dependent variable. The methodology of the study is a content analysis of annual reports of a sample of 10 out of 14 (71%) companies in the energy sector and 10 out of 11 (91%) in the tourism sector for the period 2008-2012. The findings of the study indicate that there is a statistically positive association between size, growth rate and return on assets and leverage. Regression analysis indicates that only size and profitability have a statistically significant effect on leverage.

**Keywords:** Leverage, Size, Return on Assets, P/E Ratio, Risk, Total Assets

## 1. INTRODUCTION

This study is the first attempt to determine the determinants of capital structure in a sample of the Omani Services companies (tourism and energy sectors) listed on Muscat Securities Market. The study attempts to answer the following question: what are determinants of capital structure? Two hypotheses in each sector were tested. The first hypothesis tested the associations between the independent variables and dependent variable. The second one tests the impacts of independent variables on dependent variable.

The methodology of the study is a content analysis of annual reports of a sample of 10 out of 14 (71%) companies in the energy sector and 10 out of 11 (91%) in the tourism sector for the period 2008-2012. The problem of the study is that the results of previous studies about the associations between some determinants of capital structure and leverage are mixed. Some of them concluded positive relations, others negative associations and several studies conclude that there is no correlation between them. In Sultanate of Oman, there is no evidence about the impact of determinants of capital structure on the leverage of the services companies.

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The business environment in Sultanate of Oman is a very big opportunity for investors in the industrial sector because the investment laws and regulation give them this opportunity to build their investments. Unfortunately, there is no any studies examine the associations between so many determinants of capital structure in the industrial sector (or any other sectors) despite the importance of this sector. The investments in the industrial sector are very huge and it is need to analyzed and examined. Therefore, this is the first attempt to examine and analyze the determinants of capital structure. Finally, the financial statements of the industrial companies are distorted. For example, there is a very large gap between assets and incomes. The amounts of assets are very big but the net income and return on assets are very low.

The study consists of seven sections. In the current section, the study presented the introduction including the aims of the study and the hypotheses. The theory of capital structure is discussed in the second section. The third section presents the literature review. In the fourth section, the study presented the model, data and methodology used in this study. Sections five and six provide results of the analysis and finally, in the section seven, the study presented the summary and conclusions.

### 2. CAPITAL STRUCTURE THEORIES

The decision how companies work out their capital structure is one of the most widely researched areas. The capital structure used to finance the companies' assets, has implications shareholders value and firm value. Therefore, the financial manager should seek that capital structure which maximizes the value of the firm (the optimal capital structure).

Capital structure is the mixture of sources of funds a company uses (debt, preferred stock, retain earnings and common stock). The amount of debt that a company uses to finance its assets is called leverage. A company with a lot of debt in its capital structure is said to be highly levered. A firm with no debt is said to be unlevered. A company's capital structure is determined by the assumptions of debt and equity capital used in financing the company's assets. The financial manager should seek that capital structure which maximizes the value of the firm (Pahuja and Sahi, 2012).

In the literature review, the title determinants of capital structure were examined widely. This is because there is no theory of capital structure could be applied in all cases. According to Myers (2001, p.81), *"there is no universal theory of the debt -equity choice, and no reason to expect one"*. However, most of studies used a conditional theory to examine the determinants of capital structure in one company, sector or country. A conditional theory means that there are some determinants related to the case subject to analysis. Frank and Goyal (2009) explain that the conditional theories can be divided into three theories: Pecking-order theory, Tradeoff theory and Market timing theory.

In the Pecking- Order Theory (POT), the company prefers the internal financing or sources such as retained earnings then it is tend to external financing or sources. According to POT the profitable companies are less likely to undertake external financing for new projects because they have the available internal financing for this purpose (Hijazi and Tariq, 2006).

The second theory is Static Trade off Theory (STT). In this theory, the company follows a target debt-equity ratio (leverage) and then behaves accordingly. The company has a capital structure consisted of equity and debt so the balancing between them is very important. The balancing required that use more loans will increase the risk of the company despite the fact that it is accompanied by an increase in the return. It also reduces the risk of the share price and increases the return.

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The last theory is Market Timing Theory (MMT). The MMT explains that companies prefer equity when the cost of this equity is low, and prefer debt otherwise. According to this theory, companies sometimes perceive their risky securities as misstated values by the market. Conditional on having financing needs, companies issue equity when they perceive the cost of equity as low, and issue debt when they perceive the cost of equity as high (Huang and Ritter, 2004).

Miglo (2010) reviewed these theories in details, basic models, major results and evidence. Under the trade-off theory, the prediction is the leverage should be inversely related to the expected bankruptcy costs. The explanations provided by pecking order theory for such phenomena are there is negative correlation between external financing and profitability, negative share price reaction on equity issue announcements and better share price reaction on debt issues than on equity issues. Evidence mostly support market timing theory in that companies wait until the market conditions get better and that share have high return prior to equity issues and that prior to issue companies window-dress or improve their performance at least on paper.

### 3. LITERATURE REVIEW

The literature review of determinants of capital structure is not new. The origins of these studies back to the pioneered work of Modigliani and Miller (1958). Frank and Goyal (2003) examine the relative importance of 39 factors in the leverage decisions of publicly traded U.S. firms. The most reliable factors are median industry leverage (+ effect on leverage), bankruptcy risk as measured by Altman's Z-Score (- effect on leverage), firm size as measured by the log of sales (+), dividend-paying (-), intangibles (+), market-to-book ratio (-), and collateral (+). Somewhat less reliable effects are the variance of own stock returns (-), net operating loss carry forwards (-), financially constrained (-), profitability (-), change in total corporate assets (+), the top corporate income tax rate (+), and the Treasury bill rate (+).

Bancel and Mittoo (2004) explore the link between theory and practice of capital structure through survey managers of firms in seventeen European countries on their capital structure choice and its determinants. Financial flexibility, credit rating and tax advantage of debt are the most important factors influencing the debt policy while the earnings per share dilution are the most important concern in issuing equity. Evidence also supports that the level of interest rate and the share price are important considerations in selecting the timing of the debt and equity issues respectively.

Hijazi and Tariq (2006) attempt to determine the capital structure of listed firms in the cement industry of Pakistan. The study took 16 of 22 firms in the cement sector, listed at the Karachi Stock Exchange for the period 1997-2001 and analyzed the data by using pooled regression in a panel data analysis. These determinates are: firm size (measured by natural log of sales), tangibility of assets, profitability and growth and further analyzed the effects on leverage. The results of the study indicate that, except for firm size, were found to be highly significant. Frank and Goyal (2009) examine the relative importance of many factors in the capital structure decisions of publicly traded American firms from 1950 to 2003. The determinants of leverage are: median industry leverage (+ effect on leverage), market-to-book assets ratio (-), tangibility (+), profits (-), log of assets (+), and expected inflation (+). However, for book leverage, the impact of firm size, the market-to-book ratio, and the effect of inflation are not reliable.

Hasan and Butt (2009) explore the relationship between corporate governance and capital structure of listed companies in an emerging equity market, Pakistan. The study covers the period 2002 to 2005 for which firm level data for 58 randomly selected non-financial listed companies from Karachi Stock Exchange has been examined by using multivariate

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regression analysis under fixed effect model approach. Measures of corporate governance employed are board size, board composition, and CEO/Chair duality. Impact of shareholding on financing decisions has also been examined by using managerial shareholding and institutional shareholding. Results reveal that board size and managerial shareholding are significantly negatively correlated with debt to equity ratio. Therefore results suggest that corporate governance variables like size and ownership structure and managerial shareholding play important role in determination of financial mix of the firms.

Correa *et al.* (2007) analyze some of the determinants of capital structure leverage of the largest Brazilian firms, in light of the Pecking Order theory and the Trade-Off theory. The results indicate that leverage is negatively related to the importance of tangible assets and to profitability, while it is positively related to business risk. They also indicate that foreign owned companies are more in debt than national firms. Al-Shubiri (2010) examines the determinants of capital structure –age of firm, size of firm, asset structure (tangibility and liquidity), business risk, growth rate, earning rate (ROA), non tax shield as independent variables and degree of operating leverage-of the industrial companies listed to Amman Stock Exchange from the period 2004-2007. The results of the study indicate that there is a positive significant relationship between the firm size, asset structure/ tangibility, growth rate, and non tax shield and the degree of leverage at different sign level 1% and 5%. But there is a negative significant relationship between earning rate (ROA) and leverage at sign level 5%. Finally, the results show there is no significant relationship between the number of age firm, assets structure / liability and business risk as independent variables and degree of leverage.

Kilani (2012) examines the possible relation between ownership structure and capital structure in the industrial firms in Jordan for the period 2004 to 2008. The multiple regressions at 5% significant level have been used. The findings of the study indicate that the Jordanian industrial firms tend to use ownership financing to finance their activities. Also find that there is no statistically significant evidence that the ownership structure affect the Capital structure in the Jordanian industrial firms. Pahuja and Sahi (2012) analyze the factors determining the capital structure of Indian companies. This analysis is grounded on agency theory and pecking order theory. The paper takes into consideration dependent variable being debt equity ratio and independent variables viz. size, growth, profitability, liquidity and tangibility. The data for a sample of 30 companies constituting Bombay Stock Exchange's SENSEX (sensitivity index) was considered for a period comprising 2008-2010. Two major determinants of capital structure are found to be growth and liquidity according to the results of the study.

## 4. RESEARCH DESIGN AND HYPOTHESES

### 4.1. Hypotheses development

Based on the literature review and theoretical implications of capital structure, the following determinants are examined and analyzed.

#### 4.1.1. Tangibility assets

Assets structure is a group of assets (tangible) holding by the firm to establish and expand its business (Reyhani, 2012). It is assumed, that tangible assets can be used as collateral. In this regards, many studies assert that if the company has large tangible assets, the leverage will be increased. Moreover, the high level of fixed assets gives the company a good opportunity to increase the level of leverage because the company can be used these assets as collateral. Therefore, as Bauer (2004) determined, that a positive relation between tangibility and leverage is predicted. For the purpose of present study, we measured the tangibility assets as fixed assets divided by total assets. In this case, the hypothesis as follows:

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**H1: Firms with higher levels of tangibility of assets exhibit higher levels of leverage.**

## 4.1.2. Size of the company

There is a negative relation between size of the company and bankruptcy. Therefore, size has been viewed as a determinant of company's capital structure. Larger firms are more diversified and hence have lower variance of earnings, making them able to tolerate high leverage (Kilani, 2012). Frank and Goyal (2009) indicate that there is empirical evidences support a positive relationship between size and capital structure. For the purpose of present study, we measured the size of company by the natural algorithm of total assets. The hypothesis is:

**H2: Firms with higher levels of total assets exhibit higher levels of leverage.**

## 4.1.3. Growth rate

According to Myers (1977), firms with high future growth opportunities should use more equity financing, because a higher leveraged company is more likely to pass up profitable investment opportunities. This is because firms with higher growth rates, which demand more resources than they can generate, would tend to seek these resources required for expansion outside the company (Correa *et al.* 2007). Therefore, most of studies found a negative relation between growth and leverage. For the purpose of the present study, the P/B ratio (market-to-book ratio) is used as a proxy for growth opportunities.

**H3: Firms with higher levels of growth exhibit lower levels of leverage.**

## 4.1.4. Profitability

There are many literature review indicated that there is a negative relationship between profitability and leverage. This means that the high profitable firms will have the funds generated internally by the profits, which means that the financial leverage is low. The profit and retained earnings will be used first as investment funds after which will be moved on to bonds or other types of outside financing (Huang and Song, 2006). For the purpose of the present study, return on assets (ROA) is used as a proxy for profitability.

**H4: More profitable firms exhibit lower levels of leverage.**

## 4.1.5. Risk

Risk is a proxy for the probability of financial distress and it is generally expected to be negatively related with leverage. This may imply that growing companies have enough internal funds for their financing needs but, more likely, it may imply that as growing companies tend to be more risky, they prefer to use less debt (Buferna *et al.* 2005). However, as Huang and Song (2006, p.9) state based on findings of Hsia (1981): "*As the variance of the value of the firm's assets increases, the systematic risk of equity decreases. So the business risk is expected to be positively related to leverage.*" For the purpose of the present study, standard deviation of return on assets is used as a proxy of risk.

**H5: Firms with a greater risk exhibit lower levels of leverage.**

## 4.2. Sample selection

The target population is the service sector in Sultanate of Oman. This sector is one of very important sectors in this country. There are 44 companies in this sector listed on Muscat Securities Market (MSM) during the period of this study. There are two samples of the study;

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companies at tourism and energy sub sectors. The methodology of the study is a content analysis of annual reports of a sample 20 companies out of 44 (45%). 10 out of 14 (71.5%) companies in the energy sector and 10 out of 11 (91%) in the tourism sector for the period 2008-2012.

### 4.3. Definition the variables

Table 1 explained the definition of the independent variables and dependent variable as follows:

Table 1: Definition of the variables		
Variables	Code	Measure
Independent Variables		
Tangibility	T	Fixed assets/ total assets
Size	S	Natural algorithm of total assets
Growth Rate	G	Price-to- book ratio
Profitability	P	Return on Assets (ROA)
Risk	R	Standard Deviation of ROA
Dependent Variable		
Leverage	L	Total liability to total Assets ratio

As in the introduction, the present study examines the associations between above independent variables and dependent variable. These associations discussed in the following section.

## 5. EMPIRICAL ANALYSIS

The study examines the associations and regression as follows.

### 5.1. Omani services sector (20 companies)

The correlation analysis was used to association between the variables in order to verify whether there is any linear correlation between and among the variables of interest of the study. Pearson's coefficient was used to verify the existence or non- existence of linear correlation between and among the quantitative variables. The results of the correlation showed as in the table 2 indicate that the correlations of G, P and S are significant at 5%, while the correlations of T and R are insignificant at 5%. This means the there are positive associations between G, P and S with financial structure or leverage.

Also, Table 2 showed the summary of regression analysis of Model 1. The study used the regression analysis to examine the impact of five independent variables on the leverage in the Omani service sector. The regression equation as follows:

$$L = \alpha + \beta_1 T + \beta_2 S + \beta_3 G + \beta_4 P + \beta_5 R \quad (1)$$

The model of regression is significant at 5% because the Sig. of F- Value (0.013) is less than 5%. In this case, there is at least one variable in the model does have impact on the leverage. As indicated in the Table 2, the coefficients P and S are significant at 5% because the Sig. of T-value are less than 5%.

In summary, the profitability (P) and size of company (S) do have impact on the capital structure (L) in the Omani Services Sector.

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**Table 2: Summary of correlations and regression for Omani services sector (20 companies)**

(20 companies)													
Model	I.V.	R	D.V	R <sup>2</sup>	F-Value	Sig.	Coefficients						
							Variables	T-Value	Sig.				
1	T	0.127	L	0.102	2.319	0.013	Constant	0.376	0.013				
	G	0.420*					T	0.312	0.759				
	P	0.561*					G	0.844	0.413				
	S	0.547*					P	-0.063	0.041				
	R	-0.231					S	0.179	0.020				
							R	-0.535	0.601				

\* Correlation is significant at the 0.05 level (2-tailed).

I.V= Independent Variables

D.V= Dependent Variable

### 5.2. Tourism sector

In addition to the analysis of the companies as whole, the study tested the correlation and regression in Hotel sector. This sector is one of the most important sectors in the Sultanate of Oman. This is because the country has some features such as mild weather in the south (Dhofar Region-Salalah), where the temperatures remain at a low level compared to other countries in the region, where temperatures range between 25-30 degrees throughout the year. For these reasons, there are many tourism projects in Sultanate of Oman, but only 11 of them registered on MSM. 10 out of 11 have completed financial statements and subjected to analysis.

The results of the correlation showed as in the table 3 indicate that the correlations of G, and P are significant at 5%, while the correlations of T, G and R are insignificant at 5%. This means the there are positive associations between G and P with financial structure or leverage.

Also, table 3 showed the summary of regression analysis. The R-Square is equal to 83.7%, which indicates that independent variables in the model interpret 83.7% of the total variance. The model of regression is significant at 5% because the Sig. of F- Value (0.048) is less than 5%. In this case, there is at least one variable in the model does have impact on the leverage. As indicated in the Table 3, the coefficients P and S are significant at 5% because the Sig. of T-value are less than 5%.

In summary, the profitability (P) and size of company (S) do have impact on the capital structure (L) in the Tourism Services Sector. Table 3 summarized the results as follows:

**Table 3: Summary of correlations and regression for tourism sector (10 companies)**

Table 1. Summary of Correlations and Regression for Learning Sector (No Companies)													
Model	I.V.	R	D.V	R <sup>2</sup>	F-Value	Sig.	Coefficients						
							Variables	T-Value	Sig.				
1	TT	-0.328	LT	0.837	4.112	0.048	Constant	-0.359	0.738				
	GT	0.476*					TT	-1.785	0.149				
	PT	0.514*					GT	0.674	0.538				
	ST	-0.161					PT	3.125	0.035				
	RT	-0.132					ST	2.782	0.040				
							RT	-2.113	0.102				

\* Correlation is significant at the 0.05 level (2-tailed).

### 5.3. Energy sector

In this sector, there are 14 companies registered on MSM, but the present study analyzed the financial statements for only 10 companies according to the available information.

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The results of the correlation showed as in the table 3 indicate that the correlations of G, and S are significant at 5%, while the correlations of T, G and R are insignificant at 5%. The correlation between S and financial structure or leverage is positive at 5%, while there is a negative association between G and financial structure or leverage

Table 4 showed the summary of regression analysis. The coefficient of determination is equal to 72.1%, which indicates that independent variables in the model interpret 72.1% of the total variance. The model of regression is significant at 5% because the Sig. of F- Value (0.038) is less than 5%. In this case, there is at least one variable in the model does have impact on the leverage. As indicated in the Table 4, the coefficients P and S are significant at 5% because the Sig. of T-value are less than 5%.

In summary, the size of company (S) does have impact on the capital structure (L) in the Energy Services Sector.

**Table 4: Summary of correlations and regression for energy sector (10 companies)**

Model	I.V.	R	D.V	R <sup>2</sup>	F- Value	Sig.	Coefficients		
							Variables	T-Value	Sig.
1	TE	0.465	LE	0.721	2.070	0.038	Constant	-0.558	0.606
	GE	-0.437*					TE	1.274	0.272
	PE	-0.165					GE	-2.044	0.110
	SE	0.314*					PE	1.395	0.235
	RE	-0.369					SE	2.635	0.038
							RE	0.254	0.812

\* Correlation is significant at the 0.05 level (2-tailed).

The final results of the associations between the five variables and financial structure were presented at Table 5 as follows:

**Table 5: Summary of results**

Variables	Services Sector	Tourism Sector	Energy Sector
Tangibility	Insignificant	Insignificant	Insignificant
Size	Significant	Significant	Significant
Growth Rate	Insignificant	Insignificant	Insignificant
Profitability	Significant	Significant	Insignificant
Risk	Insignificant	Insignificant	Insignificant

As shown in the table 5, the size of company has impact on financial structure (leverage) in the services sector and the two subsectors. On the other hand, profitability has impact on the services sector as whole and may be this impact comes from the tourism sector. Finally, the tangibility and risk don't have any impact on the financial structure in all sectors.

## 6. DIFFERENCES ANALYSIS

The study used T-test (two- independent samples) and Mann Whitney to test the differences between two samples. In the independent samples case, the study used these two tests because the results of normality of the sample are mixed (see Table A1). The following results related to differences between two samples.

### 6.1. Tangibility, profitability and size

The test of normality showed that the distribution is normal because the Sig. more than 0.05. Therefore, the study used T- test analysis to examine the differences of tangibility, Profitability and Size between two sectors. Table 6 showed that the result of this analysis indicates that there are no differences between the two sectors about tangibility and profitability variables. There is a significant differences between the two sectors related the



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size of the company. This is because the invested of total assets are more different between the two sectors.

**Table 6: T-test analysis**

Variables	Levene's Test for Equality of Variances	
	F	Sig.
<b>T</b>	1.379	0.256
<b>P</b>	0.314	0.582
<b>S</b>	5.864	0.026

### 6.2. Risk and growth rate

For these two variables, the test of normality showed that the distribution is not normal because the Sig. less than 0.05. Therefore, the study used Mann-Whitney test analysis to examine the differences of risk and Growth Rate between two sectors. Table 7 showed that the result of this analysis indicates that there are no differences between the two sectors about risk and growth rate variables.

**Table 7: Test statistics<sup>b</sup>**

	G	R
Mann-Whitney U	25.000	45.500
Wilcoxon W	80.000	100.500
Z	-1.890	-0.355
Asymp. Sig. (2-tailed)	0.059	0.723
Exact Sig. [2*(1-tailed Sig.)]	0.063 <sup>a</sup>	0.739 <sup>a</sup>

a. Not corrected for ties

b. Grouping Variable: G1-R1

## 7. CONCLUSIONS

This study aims at examining the determinants of capital structure in Omani services sector. Companies in two sub-sectors; tourism and energy, listed on Muscat Securities Market (MSM) were examined. The financial statements of 20 Omani services sector were analyzed for the period from 2008-2012 based on two levels; the all companies in the sample and two distinguished sectors in; tourism sector and energy sector. The total service companies listed on MSM are 44, but some companies were excluded for many reasons. Firstly, some companies have made losses for 5 years (period of study). Secondly, some companies did not present their financial statements on the website (their websites and website of MSM). Finally, there are some other sectors consisting of one or two companies such as communication sector, educational sector and financial companies sector. Therefore, for those reason, the final sample subject to analysis is 20 companies.

The study examined five determinants of capital structure; tangibility of assets measured by fixed assets to total assets ratio, growth rate measured by price-to-book ratio, size of the company measured by total assets, profitability measured by return on assets and risk measured by standard deviation of return on assets. The capital structure or leverage measured by total liabilities to total assets ratio.

There are two reasons for selecting the above determinants. Firstly, the study reviewed many literature reviews of capital structure. Secondly, according to available information about the companies, then the study defined five quantitative variables. The results of the present study are consistent with the results of most of the literature review. The overall result for the study is that the association between the determinants of capital structure and leverage is significant at 0.05 level of significance. The associations between tangibility of

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assets and risk and leverage are insignificant at 0.05. The associations between profitability, growth rate and size of the company and leverage are significant at 0.05.

Regression analysis findings indicate that the model is significant at 0.05 but there are only two determinants are significant in the regression equation. These two variables are size and profitability. In the tourism sector, the model interprets 83.7% of the total variance and there are two significant variables within the regression equation that are size of the company and profitability. In the energy sector, the model interprets 72.1% of the total variance and there is only one significant variable within the regression equation that is size of company. The findings of the study indicate that there are no differences between two subsectors about tangibility, profitability, risk and growth rate. Also, there is a difference between two subsectors about size of the company.

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### Appendix

**Table A1: Tests of Normality<sup>b,c</sup>**

Factors		Kolmogorov- Smirnov <sup>a</sup>			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	df	Sig.
T	1	0.240	10	0.108	0.800	10	0.014
	2	0.195	10	.0200 <sup>*</sup>	0.892	10	0.180
G	1	0.340	10	0.002	0.768	10	0.006
	2	0.310	10	0.007	0.714	10	0.001
P	1	0.169	10	.0200 <sup>*</sup>	0.953	10	0.701
	2	0.134	10	.0200 <sup>*</sup>	0.964	10	0.826
S	1	0.203	10	.0200 <sup>*</sup>	0.870	10	0.101
	2	0.231	10	0.139	0.851	10	0.060
R	1	0.290	10	0.017	0.765	10	0.005
	2	0.286	10	0.020	0.885	10	0.149
L	1	0.257	10	0.060	0.918	10	0.344
	2	0.185	10	0.200 <sup>*</sup>	0.933	10	0.474

a. Lilliefors Significance Correction

\*. This is a lower bound of the true significance.

b. R1 is constant when AS1 = 1.00. It has been omitted.

c. R1 is constant when AS1 = 2.00. It has been omitted.

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# WAGE DIFFERENTIALS AND DETERMINANTS IN THE HAITIAN LABOR MARKET\*

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**Abstract:** Wages are a key factor to competitiveness and to attract foreign investors. This paper examines wage differentials and determinants for the Haitian economy. Using a dataset of 953 observations from 83 organizations with a semi-log regression model, we show, in addition to professionals' qualifications and skills that organizations' origin, type and sector determine the level of wages. The paper's results can guide various stakeholders of the Haitian economy open for business. First, it can help employers take a closer look at the market wages to improve their firm performance. Second, it can help foreign investors better understand Haitian labor costs, a key determinant of investment. Finally, it could serve to policy and law makers to improve the economy competitiveness.

**Keywords:** Labor Market, Competitiveness, Performance

## 1. INTRODUCTION

Despite of well-documented studies and interest for wage differentials and determinants, little economic study has been focused on this topic specifically to the Haitian labor market. The present research paper constitutes an attempt to fill this gap. It brings new insights on the determinants and differential of wages in the Haitian labor market by including data from the public sector. It is very relevant to the context of Haiti open for business as it is well known that wages are a key factor to competitiveness and to attract foreign investors.

Using a dataset of 953 observations from 83 organizations with a semi-log regression model, we show that: i) the environment in which an organization is headquartered matters because larger city populations increase salaries; ii) the organization itself is an important consideration since factors such as organizational structure, country of origin, and sector of economic activity have all been proven to affect salary; iii) the position and the expectations that come with it with respect to supervision and computer training significantly affect salary; iv) the employee herself can possess certain skills and attributes that increase her earning potential—i.e. increased level of education, increased professional experience, increased English literacy, and being an expat.

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The paper is organized as follow. Section II discusses the related literature on labor market. Section III explains the rigorous process of collecting data. Section IV a summary and description of the data collected. Section V presents the model to estimate the data. Section VI analyses the results of the model. Section VI concludes with area for future investigation. Background of the Haitian economy and wages estimates are presented in Appendix.

### 2. RELATED LITERATURE

Wage differentials and determinants have always interested economists as attested the early works of Dunlop (1957), Slichter (1950), Rapping (1967), Masters (1969), and Kumar (1972), and other institutional economists.

These early investigations not only showed the existence of high earnings dispersion but also provided initial insights into the existence of a pattern of wage differentials. Dunlop (1957) showed large variance of average wages for truck drivers, ranging from a maximum of \$2.25 to a minimum of \$1.20 across industries. Slichter (1950) found high correlations across occupations and stable wage differentials over time for the US economy. Rapping (1967), Masters (1969), and Kumar (1972), among others, focused on estimating the effects on the average industrial wage dispersion of several industrial characteristics, such as profits, degree of concentration, union density, and the size of the firm

New interest in the topic of wage differentials sprang up again in recent years, with the studies by Krueger and Summers (1987; 1988), Dickens and Katz (1987a; 1987b), and Groshen (1986) who found that workers with identical characteristics receiving different wages across industries. What is distinctive about the recent generation of empirical studies is both their methodology and theoretical background. In terms of methodology they provide new tests for the existence of inter industrial and establishment wage differentials and for the regularities of their patterns, using improved econometric techniques and extensive controls for worker and job characteristics.

In fact, the studies in western countries mentioned above found that wage differentials are stable across time and countries and highly correlated across occupations and firm sizes. If wages studies in western countries are well documented, research on wage differentials in Latin American Caribbean (LAC) countries is more dispersed and more difficult to track down.

One of the investigations that more directly address the topic of wage differentials in Latin America is Ferreira da Silva's (1987) study for Brazil. He found that the main determinants of earnings were the individual worker's characteristics, but that firm, industry, and regional characteristics were also significant, after controlling for human capital variables. Fields and de Marulanda (1976) found that for the Colombian manufacturing sector higher (average) wages were associated with more capital-intensive sectors, with high foreign investment, and larger firms.

Macedo (1985) investigates a special aspect of the wage relation, i.e., wage differentials between private and public firms in Brazil. His results show that higher wages are paid in the public sector, even after controlling for worker characteristics. However, the general applicability of his conclusion is not very strong, since the results with human capital controls refer only to a comparison between two firms.

Other studies examine the influence of industrial attributes on wages, but mainly as extensions (control-variables) in human capital type models. In Castello Branco (1979) the degree of concentration has a positive effect on the average industrial wage for Brazil. Salazar Carrillo (1982) finds a non-significant effect for size of firm on individual earnings; however, these results must be affected by the small sample size variance.

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In general, most of the studies for LAC countries focus on Latin American countries and neglect Caribbean countries except Souza and Tokman (1978) who studied data from Dominican Republic, Paraguay and Salvador households to show that occupation, industrial sector and size of firm variables can explain nearly 25% of residual wages. Workers with similar characteristics earn 40% more in the formal than in the informal sector.

Despite of those well-documented studies and interest for wage differentials and determinants, little economic study has been focused on this topic specifically to the Haitian labor market. While Pean (2009) and Verella (2009) have written on minimum wages in Haiti, to the best of our knowledge, DeMattee (2011) was the first to perform a decent work by studying how professionals' qualifications and skills, organizations' origin, type and sector determine the level of wages in Haiti. However, his study was limited because his dataset did not include a public sector dimension.

The present research paper constitutes an attempt to fill this gap and bring new insights on the determinants and differential of wages in the Haitian labor market by including data from the public sector. It is very relevant to the context of Haiti open for business as it is well known that wages are a key factor to competitiveness and to attract foreign investors.

### 3. DATA COLLECTION PROCESS

Information asymmetry among employers is one of the many challenges facing the Haitian labor market. Prior to this research various organizations had attempted or completed salary surveys on their own. Business alliances drove some of these surveys while consulting agencies organized by a consortium of NGOs performed others. Although we were not allowed to see the results of earlier surveys they were told of their existence and shortcomings. First, with respect to the business alliance, there was unwillingness among members of the business community to share with each other confidential salary information. This is understandable and the researchers were able to overcome this challenge by taking the position of an uninterested party and maintaining a promise of confidentiality to the organizations that contributed data to the research. Second, with respect to the consulting agencies, the salary survey conducted for NGOs were limited to NGOs in or near Port-au-Prince and sampled fewer than twenty organizations and its results were not shared outside the group of NGO clients.

The scope of the data collection for this current research was throughout Haiti, not just Port-au-Prince, and targeted organizations of many sizes, types, nationalities, and purposes. The findings will be made available to all participants and other interested stakeholders but data will remain confidential.

All data was obtained by working closely with hiring managers. Managers were asked to report the budget they had for a particular position, an accountant for example. Managers reported a budget range that paid, for example, "acceptable" accountants the low-end of the budget range and paid "perfect" accountants the high-end of the range. The hiring manager was then asked to complete a survey and describe the characteristics of the "acceptable" accountant to deserve the low-end pay and what characteristics the "perfect" account must have in order to earn the high-end pay. This bookend-methodology framework allowed the data to quietly capture the change in characteristics as each hypothetical employee moved from the low-end to the high-end of the manager's budget. In some cases, hiring managers were able to provide the salary and characteristics for a third, "midpoint", and observation.

When DeMattee initially began his data collection in 2011, he thought that for every ten organizations he approached perhaps four or five would agree to participate in the study. As he started collecting the data more than nine out of ten organizations agreed to participate. Similarly, as Waddle worked with the public sector to expand the dataset he was met with a

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strong spirit of cooperation. While the motivations behind this high degree of cooperation were not explored, the researchers believe it is because managers and decision makers recognize the importance this work has on the Haiti's long-term economic trajectory. The original data collection began in June 2011, and lasted five months. The additional governmental data was finalized in June 2013, and added to the dataset then. Hundreds of meetings were held over the course of two years to collect the data required to conduct this empirical research.

### 4. SUMMARY AND DESCRIPTION OF THE DATA COLLECTED

Absent from the earlier dataset of nearly 900 observations were salaries reported by the Republic of Haiti. These researches sought to fill that void by collecting salary data from Haitian government in the same manner it was collected for the original dataset. The data for this research added sixty-eight observations to an already robust dataset assembled for the aforementioned work.

For the initial research, two surveys were created that allowed employers to easily provide nuanced data to the project. The surveys were professionally translated from English to French to eliminate language barriers. First, the Organizational Survey (see appendix for Attachment 1.1) is a one-page document that captures important employer information—e.g. size of the organization, its scope of activity, its organizational structure and nationality, etc. This information was completed once for each employer. Second, the Position Survey (see Attachment 1.2) is a multi-page document that contains nineteen questions. These two surveys and their twenty-six carefully worded questions were vetted for understanding and edited several times to achieve maximum understanding. Hiring managers provided unprompted answers and asked for clarification as needed. Surveys that were not fully completed were eliminated.

For the additional governmental data, the researchers worked with Haitian governmental officials to collect data in a similar manner. The process was streamlined slightly and respondents were asked to provide data only for those questions found to be statistically significant in DeMatttee's original work. While this strategy allows for greater precision to be added to the earlier model's independent and category variables it does not allow the researchers to revisit predictors originally found to be unimportant and retest them for significance.

The researchers used a single data source to identify and measure how an organization's characteristics and employee's each affect salaries. The dataset was culled to 953 unique observations after the removal of outliers and incomplete observations. The observations used were from 83 independent organizations ranging from two to 1,800 employees. Tables 1, 2, 3, and 4 provide a summary of the composition of the data with respect to city, organizational structure, economic sector, and position, respectively.

Table 1 shows the distribution of observation by city size, which is a high-level view of the data. City sizes range from 15,000 to 500,000 people. Over two-thirds of the data was collected from Port-au-Prince, the country's most populous city with over a half-million people. Approximately 53% of observations from Port-au-Prince are from for-profit organizations and the balance was near equally split between NGOs and organizations identified as Other, Religious, or Government.

Tables 2 and 3 show the distribution of observations along two other dimensions at the more specific organizational level. Table 2 shows the dataset has large numbers of observations for all organizational structure types with the exception of Religious organizations, which represent less than 6% of the dataset. This project controlled for five organizational structure

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types and identified each as independently significant variables and each statistically different from organizational structure type NGO.

Table 3 shows the sixteen categories of economic sectors controlled for in the study. The variability in this control group is high with the largest percentage, 12.6%, belonging to the other sector category, which includes governmental observations<sup>1</sup>. This paper will identify eight of these sixteen economic sectors as independently statistically significant while the group as a whole is statistically significant. Lastly, Table 4 shows the distribution of observations at the more granular level of position. There are twenty-two positions controlled for in the study—the most multifarious of any control group—with the highest concentrations of observations belonging to Senior Managers and Cleaning Crew, 13.2% and 10.2%, respectively. Seven of these category variables are independently significant while the group as a whole is statistically significant.

**Table 1: Observations by city size**

City Size	Frequency	Percent	Cumulative
Small & Medium	77	8.10%	8.10%
Large	187	19.60%	27.70%
Extra-Large	689	72.30%	100.00%
Total	953	100.00%	

**Table 2: Observations by organizational structure**

Org. Structure	Frequency	Percent	Cumulative
NGO	201	21.10%	21.10%
For-Profit	529	55.50%	76.60%
Other	104	10.90%	87.50%
Religious	51	5.40%	92.90%
Government	68	7.10%	100.00%
Total	953	100.00%	

This paper identifies and measures the independent effect various variables have on salaries, referred to henceforth as *salary drivers*. These salary drivers are mostly category variables and can be grouped into four broad categories: Geographical & Municipal, Organizational, Position, and Person. Table 5 shows these four broad groups and the variables controlled for in each.

The Geographical & Municipal group contains variables that control for differences in population. The Haitian Department of Information and Statistics (IHSI) provided city-level population estimates for the municipalities of Haiti for the year 2011. A city's total population was reported in terms of urban and rural and reported in terms of the sections that compose the larger city.

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<sup>1</sup> Government salary observations were merged with other salary observations when controlling for activity of economic sector for reasons of multicollinearity. The reason being is that it is not advisable to have two perfectly correlated variables in a regression model, which would have been the case for government salaries had those observations been coded to Government organizational type and Government economic sector variables.



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**Table 3: Observations by economic sector**

Econ. Sector	Frequency	Percent	Cumulative
Agriculture	53	5.60%	5.60%
Airlines	26	2.70%	8.30%
Banking	34	3.60%	11.90%
Construction	65	6.80%	18.70%
Education	95	10.00%	28.60%
Gas/Petro	39	4.10%	32.70%
Hotels	10	1.00%	33.80%
Humanitarian	112	11.80%	45.50%
Int'l Development	67	7.00%	52.60%
Manufacturing	67	7.00%	59.60%
Medical	62	6.50%	66.10%
Orphanage	14	1.50%	67.60%
Other	120	12.60%	80.20%
Retail	57	6.00%	86.10%
Service	92	9.70%	95.80%
Telecomm	40	4.20%	100.00%
Total	953	100.00%	

In DeMattee (2011) the Organization group collected data for many organizational characteristics in an attempt to control for differences between salaries. Only three were found to be statistically significant: Organizational Structure, Economic Sector, and Country of Origin. Additional data collected from the government include these three organizational category variables. All employers were self-identified themselves as one of four organizational structures: NGO, For-Profit, Other, Religious, or Government. Graph 1 shows the variability of wages along this dimension.

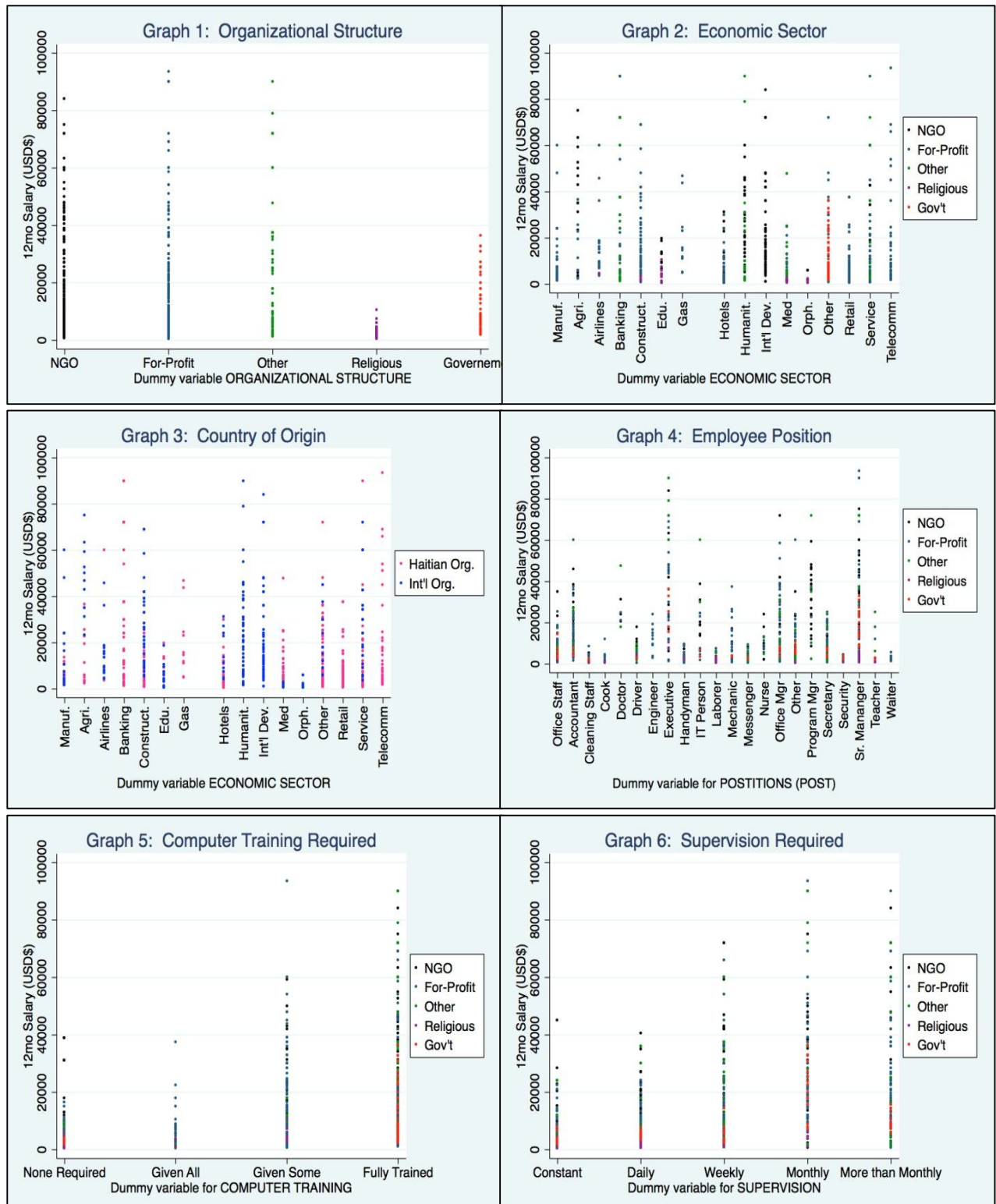
The second is the economic sector in which the employer operates. All employers identified themselves as belonging to one of sixteen economic sectors<sup>2</sup>. Graph 2 shows the variability of salary along this second organizational dimension while color-coding observations according to organizational structure type. The third was country of origin. All employers identified themselves as either Haitian or international organizations. Graph 3 shows the variability of salary along this dimension in each economic sector. As can be seen in Graphs 2 and 3, there is much variability in salary at the organizational level.

Determining the effect of government data on DeMattee (2011) is the primary goal of this research. This goal is accomplished by analyzing organizational-level variables while controlling for other position- and person-level variable groups. These groups control for the skills necessary to hold a position—e.g. an IT professional expected to have computer training—or characteristics that define a person—e.g. education level and years of professional experience. As Graph 4 shows, the variability of wages with respect to the twenty-two positions and organizational structure type is quite high. Necessary computer training and required supervision are characteristics of a position. If a position requires use of a computer intuition suggests that as an employee increases her computer proficiency her salary increases. This may be because training personnel on technology consumes

<sup>2</sup> The sixteen sectors are: agriculture and farming, airlines, banking and finance, construction, education, gasoline and petro production, hotel and lodging, humanitarian, international development, manufacturing, medical, orphanage, other, retail sales, services, and telecommunication.

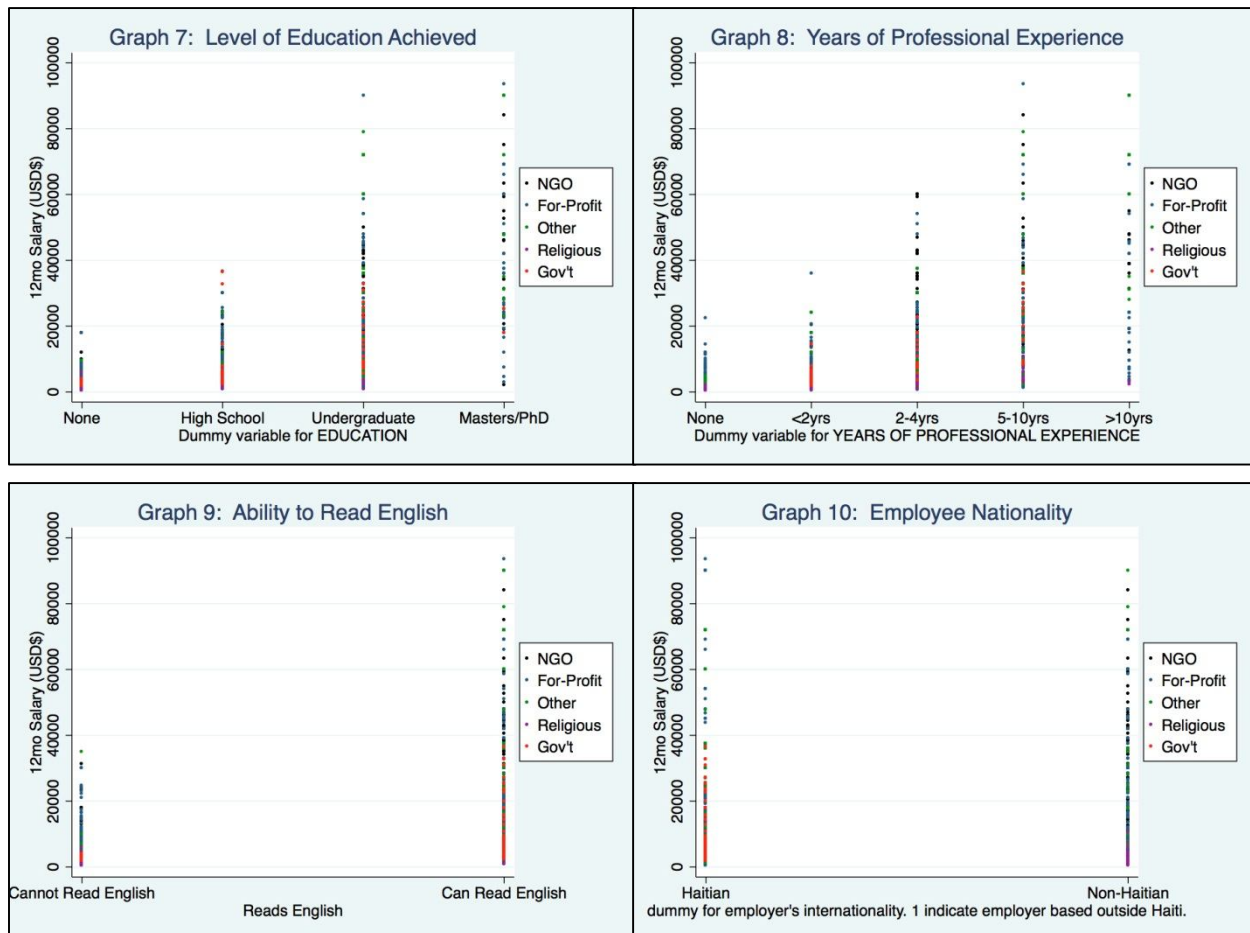
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organizational resources that may be costly and hence employers may be willing to offer higher salaries to those professionals with greater technology training. Similarly, the less supervision an employee requires the more valuable she maybe be to an organization. Intuitively this makes sense because there is an opportunity cost incurred when a manager's time is spent supervising an employee and if the manager can minimize the time spent supervising she can spend time on more productive tasks. Graphs 5 and 6 show the seemingly positive relationship salary has with computer training and employee autonomy, respectively.



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The remaining variables in the Person group pertain to an employee's personal profile. This includes formal education received, years of professional experience, English literacy, and nationality. A priori, it would seem that education and years of professional experience are each positively correlated with higher salary. Graphs 7 and 8 seem to support this claim and the model mathematically proves this to be true. The employee's ability to read English and the employee's nationality are binary conditions that are statistically significant salary drivers. Although these effects are not as easy to recognize in Graphs 9 and 10, English literacy and international nationality are both positively correlated with salary, 0.48 and 0.32, respectively, and have relatively strong statistically significant coefficients in the model.



### 5. DATA ESTIMATION MODEL

The goal of the research is to identify the characteristics of organizations and employees that effect salary and precisely quantify those causal relationships. To that end, the researchers used omitted least square regression analysis to methodically eliminate insignificant variables and build a specification that successfully explains the variability in the data and can predict salaries.

Early analysis<sup>3</sup> showed that the indicators have a non-linear effect on the dependent variable, Salary. The core specification regresses salary against variables from the

<sup>3</sup> Box-Cox test results suggest a Theta power of 0.094 is the best fitting transformation, which is nearer zero and closer to the non-linear functional form. A semi-log specification generates a more positive "log likelihood score": -9.327 versus -10.018.

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aforementioned four groups of salary drivers. The final specification uses fifty-eight variables and its abridged form is as follows:

$$\ln(\text{Salary}) = \alpha + \beta \text{Structure}_5 + \gamma \text{Position}_{22} + \delta \text{Population} + \epsilon \text{Sector}_{16} + \theta \text{Organization}_2 + \vartheta \text{Computer}_4 + \iota \text{Supervision}_5 + \kappa \text{Experience}_5 + \lambda \text{Education}_4 + \mu \text{English}_2 + \nu \text{Employee}_2 \quad (1)$$

The subscript following each variable category represents the number of coefficients included in each category and includes the omitted variable. The *Structure* variable controls for the five types of organizational structures already mentioned. The *Position* variable controls for twenty-two position types. These two variable categories combine to explain slightly more than 50% of the variability in the salary data. At the geographic level, *Population* is a floating variable that controls for differences in city size. At the organizational level, *Sector* controls for the sixteen types of economic sectors in which an organization can operate. *Organization*, a binary dummy variable, controls for an organization's country of origin. At the position level, *Computer* controls for the amount of computer training required in a position while *Supervision* controls for the amount of supervision deployed by the employer to manage the employee. Finally, at the person level, *Experience* controls for a person's years of professional work experience while *Education* controls for the amount of formal education received by the individual. *English* is a binary dummy variable that controls for a person's ability to read English and *Employee*, another binary dummy variable, controls for the nationality of the employee.

Table 4 presents results from the final specification and reflects simple before-and-after estimates that each addition to the specification has on the predictive power of the model. The authors chose to use organizational structure as the foundation and added to it methodically to increase the predictive power of the model. The table shows an increasing Adjusted R-squared as more variables are added to the model. This is interpreted to mean that each inclusion of new variables increases the model's ability to explain the variability of the dataset by an additional six to thirty-five percentage points, depending on the iteration. The resulting specification in column six is a good predictive model. It includes 953 observations and uses fifty-eight variables to explain 79.28% of the variability in the salary data, as represented by the R-squared<sup>4</sup>. The ratio of variables to observations is low, approximately 1:16, and most of the predictors are individually statistically significant but at the very least belong to a statistically significant group.

Table 4 seems to disprove the commonly held belief: "In Haiti, NGOs pay much higher wages for a particular position than for-profit businesses. Some pay two, three or four times as much." The model does support the claim that NGOs pay higher wages than other organizations; in fact they pay on average 47% more<sup>5</sup>. A series of tables in the appendix calculates specific salary estimates for unique structure, sector, and position permutations while using means for all other variables. These estimates, while easily presented in a series of tables, are imprecise because of the manner in which they are calculated. As shown above in Equation 1, there are fifty-eight variables that group into eleven categories. To properly calculate a salary estimate an individual would use only one point estimate in each variable category multiply all other point estimates in the category by zero. To present these findings in table form would require an eleven-dimensional table. As this is an impossibility DeMattee and Waddle present their estimates along three dimensions: i) a series of tables in Section B of the appendix controls for organizational structure type; ii) the vertical axis of

<sup>4</sup> The R-squared measure is not included in Table 6 because the model's degrees of freedom changed as new variables were added. The Adjusted R-Square measure is a better metric to compare similar models of the same functional form.

<sup>5</sup> Holding all else equal, the effect of leaving an NGO to work for a For-Profit employer is predicted to change salary by  $100 \times (e^{-0.2074252} - 1)\% = -18.73\%$ ; leaving a For-Profit to work for an NGO employer will change salary by  $100 \times (e^{0.207452} - 1)\% = 23.05\%$ . The average change in salary from any of the four organizational structure types to an NGO is 46.59%

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each two-dimensional table controls for economic sector; and iii) the horizontal axis controls for position type. These are only three of the eleven variable categories, however. The point estimates in each of the remaining variables categories are multiplied by the relative frequency a characteristic was represented in the data of a particular position type. For example, in the dataset 15% of the observations are coded as having no professional experience. While this frequency is true for the dataset it is reasonable to assume that it varies by position type—e.g. Cleaning Crew position (97 observations) and the Engineer position (71 observations)—and therefore relative frequencies were calculated not at the more precise position-level.

**Table 4: Total effect of salary drivers on salary**

Dependent Variable is ln(Salary)						
geometric mean ln(Salary) = 6.972973						
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Organizational Structure Dummies</i>						
<i>For-Profit</i>	-0.74*** (-8.12)	-0.44*** (-5.95)	-0.41*** (-6.08)	-0.24* (-2.20)	-0.36*** (-3.68)	-0.21* (-2.29)
<i>Other</i>	-0.094 (-0.72)	-0.023 (-0.22)	-0.23* (-2.41)	-0.16 (-1.38)	-0.39*** (-3.73)	-0.32*** (-3.34)
<i>Religious</i>	-1.98*** (-11.56)	-1.53*** (-10.78)	-0.90*** (-6.42)	-0.71*** (-4.51)	-0.47** (-3.26)	-0.54*** (-4.22)
<i>Government</i>	-0.64*** (-4.16)	-0.57*** (-4.71)	-0.77*** (-6.87)	-0.35 (-1.88)	-0.65*** (-3.90)	-0.43** (-2.92)
<i>(omitted variable = NGO)</i>						
adj. R-sq	0.15	0.507	0.579	0.644	0.719	0.779
N	953	953	953	953	953	953
<i>Control Variables Included (Y signifies inclusion in the model)</i>						
City Population			Y	Y	Y	Y
Organizational Structure	Y	Y	Y	Y	Y	Y
Economic Sector of Activity				Y	Y	Y
Organization's Country of Origin				Y	Y	Y
Position Type		Y	Y	Y	Y	Y
Computer Training					Y	Y
Supervision Required					Y	Y
Educational Level						Y
Years of Professional Experience						Y
English Literacy						Y
Employee Nationality						Y

**Notes:** Statistical significance at 5%, 1%, and 0.1% are denoted by \*, \*\*, and \*\*\*, respectively and t statistics are given in parentheses.

(1) Structure includes the five types or organizational structures controlled for in the study.

(2) Position includes the twenty-two unique positions controlled for in the study.

(3) Geography includes variables that control for geographic differences, specifically city size.

(4) Organization includes an organization's activity in sixteen economic sectors and country of origin.

(5) Characteristics include characteristics needed in the position, e.g. computer training and supervision.

(6) Skills include skills possessed by an employee.

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The first table (NGO Organizational Structure Type) in the series presented in Section B provides a concrete example. An Accountant, working in the Banking sector, employed by an NGO has a predicted salary of \$23,329. To calculate this prediction the point estimates for the respective Position, Sector, and Organizational Structure were multiplied by one (all other point estimates in those three variable categories were multiplied by zero) and the remaining twenty-two point estimates of the remaining eight variable categories were multiplied by the relative frequency each characteristic had within the Accountant observations—e.g. 6% had zero professional experience, 22% had less than two years of professional experience, 40% had between two and four years, 26% had between five and ten years, and 6% had more than ten years. These relative frequencies were then recalculated for each position type and used to calculate each estimate in the series of tables. Had relative frequencies been calculated at the data-level instead the prediction would have fallen to approximately \$16,550. These estimates are tangible examples of how wages change by leaving one organizational structure for another; however, a mathematical model is more precise. Predictions can be found by selecting desired characteristics and calculating their point estimates, which are presented.

The average premium paid by an NGO over all other organizational structure types is too blunt an explanation of the statistics. The specification provides a more thorough explanation of the trade-offs faced in the labor market; specifically, if an individual leaves the employment of an NGO it is expected that salary will change by -19% if moving to a For-Profit employer, -27% if moving to an Other employer, -35% if moving to a Government employer, -42% if moving to Religious employer. Hypothesis testing was conducted to see whether organizational structures types were statistically different from NGO structure type. Individual hypothesis testing rejected those four null hypotheses<sup>6</sup> with 95% or greater certainty in each instance.

In addition to organizational structure, other variables were found to affect salary. As can be deduced from Table 5, an employee gaining possession any of any one of three characteristics will increase her salary significantly. Gaining the ability to read English (t-stat 4.26; p-value 0.000) or moving to an employer that is non-Haitian (t-stat 5.99; p-value 0.000) will increase salary by 27% and 52%, respectively. If an individual is a non-Haitian employee, a characteristic over which an employee likely has little control, her pay will be 57% higher (t-stat 4.00; p-value 0.000). Other variables belong to groups that are slightly more difficult to interpret.

**Table 5: Independent binary variables**

Variable	Coefficient	Exponentiated Value	Probability of the null
English Literacy	0.242	27%	0
Int'l Organization	0.422	52%	0
Int'l Employee	0.448	57%	0

Education, for example, is a variable group that has more than one variable. The research uses four variables ranging from no formal education to a graduate degree diploma. The findings, as shown in Table 6, support the intuition that increased education begets increased compensation (F-stat 10.52; p-value 0.000). For example, holding all else equal, if a person has a high school diploma her salary will be 25% greater than a person lacking formal education. This table should be interpreted carefully as coefficients represent changes to salary relative to the omitted value No Formal Education. It is typically the case that

<sup>6</sup> The null hypothesis was that each individual organizational structure type was statistically the same as the NGO organizational structure type.

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individuals increase education received incrementally; for example, when moving from high school to college to grad school. Such a two level progression would increase salary by 26% and 8%<sup>7</sup>, respectively, which appears to signal that investment in education has diminishing marginal returns.

**Table 6: Formal education received**

Variable	Coefficient	Exponentiated Value	Probability of the null
None*	0	0%	-
HS Diploma	0.222	25%	0.003
University Degree	0.451	57%	0
Graduate Degree	0.528	69%	0

**Notes:** F-statistic for the group is 10.52, probability of the null is 0.000

\*Omitted Variable

Similar to education, increased professional work experience increases salary but its effect is stronger. As shown in Table 6, professional experience can increase an employee's earning potential by as much as 166% (F-stat 24.54; p-value 0.000). When one compares Table 6 to Table 7, one can see that employers value an employee with five to ten years of professional work experience more than an employee with a graduate degree. It is interesting to note that professional experience seems to have increasing marginal returns with each additional level of professional experience adding 22%, 23%, 25%, and 42%, respectively, to salary. In both groups of variables the model supports the intuition that individuals with increased education and increased professional experience earn higher salaries.

**Table 7: Years of professional experience**

Variable	Coefficient	Exponentiated Value	Probability of the null
None*	0	0%	-
<2yrs	0.198	22%	0.004
2-4yrs	0.407	50%	0
5-10yrs	0.628	87%	0
>10yrs	0.978	166%	0

**Notes:** F-statistic for the group is 24.54, probability of the null is 0.000

\*Omitted Variable

Supposing an employee's salary is a function of the value she is able to generate for her employer less any costs it takes her to generate said value, then it can be inferred that if she is able to keep her costs down while delivering the same amount of value to her employer then her salary should increase. The aforementioned costs may be in the form of ongoing costs (such as required supervision by a manager) or one-time start-up costs (such as computer training). As shown in Table 8, as the required supervision over an employee decreases—i.e. the less time a manager spends supervising an employee—her salary increases (F-stat 12.75; p-value 0.000). Turning now to the one-time start-up costs of computer training, as shown in Table M, if an employee possesses more advanced computer training then she is positioned to earn a higher salary (F-stat 15.43; p-value 0.000).

<sup>7</sup> Holding all else equal, the effect of adding a college education to a high school education is predicted to change salary by  $100 \times (e^{0.451 - 0.222} - 1)\% = 25.73\%$ ; and holding all else equal, the effect of adding a graduate education to a college education is predicted to change salary by  $100 \times (e^{0.528 - 0.451} - 1)\% = 8.00\%$ .

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**Table 8: Supervision required**

Variable	Coefficient	Exponentiated Value	Probability of the null
Constant*	0	0%	-
Daily	-0.015	-2%	0.782
Weekly	0.106	11%	0.105
Monthly	0.25	28%	0.001
Less than Monthly	0.346	41%	0

**Notes:** F-statistic for the group is 12.75, probability of the null is 0.000

\* Omitted Variable

The data (Table 9) appears to suggest that if an employee is hired and must be provided all necessary computer training then she will earn a lower salary. This may make some intuitive sense because extensive computer training equates to higher costs that could be adjusted for through lower salary; however, the point estimate for All Training Provided is not independently statistically significant (p-value of 0.243). The model supports the notion that as an employee requires fewer ongoing costs and/or smaller start-up costs from the organization then she is able to capture more value for herself in the form of salary.

**Table 9: Computer training**

Variable	Coefficient	Exponentiated Value	Probability of the null
None*	0	0%	-
All Provided	-0.128	-12%	0.243
Some Provided	0.178	19%	0.027
Must Possess	0.382	47%	0

**Notes:** F-statistic for the group is 12.62, probability of the null is 0.000

\* Omitted Variable

## 6. RESULTS OF DATA ANALYSIS

The use of a statistical model allows the researchers to speak intelligently to the causal relationship organizational-, position-, and employee-variables have with salaries. As described above, the model is able to quantify these effects and statistically prove a variable's individual significance even in the presence of high variability along multiple dimensions.

Graph 11.1 is another visual representation of salary variability overlaid with a quadratic line of best fit. Recall, however, that there are fifty-eight variables in the model and therefore a line of best fit is far too simplistic because of the multidimensionality underlying each observation. On the other hand, the hedonic regression analysis of the type used by DeMattee and Waddle allows for the robust statistical analysis required.

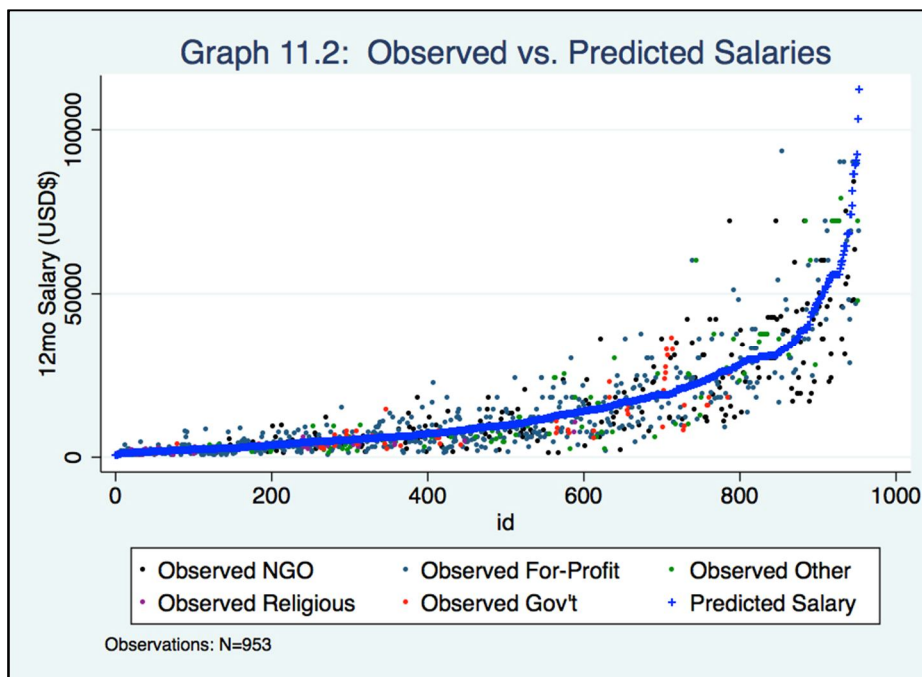
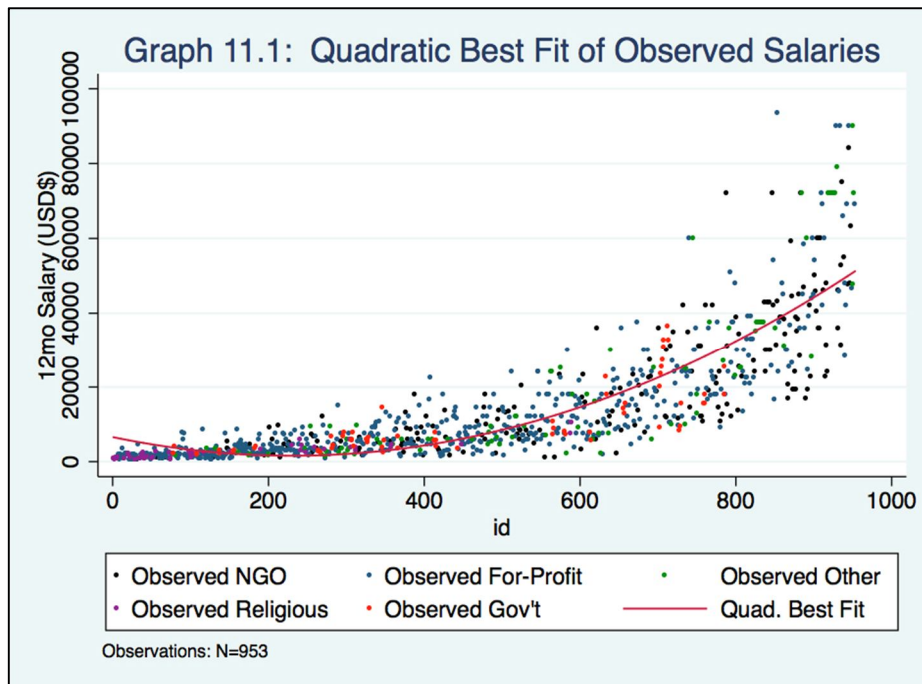
A virtue intrinsic to mathematical modeling is the ability to receive independent inputs and mathematize them into a dependent output. Using this research as an example, the observed salary can be decoupled from the reported characteristics of each observation and

those characteristics can then be used as inputs into the specification to predict a salary. The standard error of each prediction was calculated and added to the estimated salary to arrive at a final predicted salary. Observations were then sorted lowest to highest according to this final predicted salary and given an identification number. Graph 11.2 shows the observed salaries as colored dots overlaid with blue crosses that represent the 953 predicted salaries. Each dot is vertically paired with only one cross using the ID number. As can be



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seen from the graph, nearly equal amounts of observed salaries are above and below the predicted salaries.



## 7. CONCLUSION

Using a dataset of 953 observations from 83 organizations with a log-log regression model, we show that: i) the environment in which an organization is headquartered matters because larger city populations increase salaries; ii) the organization itself is an important consideration since factors such as organizational structure, country of origin, and sector of economic activity have all been proven to affect salary; iii) the position and the expectations that come with it with respect to supervision and computer training significantly affect salary;

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iv) the employee herself can possess certain skills and attributes that increase her earning potential—i.e. increased level of education, increased professional experience, increased English literacy, and being an expat.

These results must be interpreted with caution, however, and for two main reasons. First, this research is a description of how the market was in 2011, and is not a commentary on how it *should be* in 2013 or beyond. As time moves forward the above point estimates will become obsolete. It should be remembered that markets continuously recalibrate themselves towards new equilibrium as new information or shocks to supply and demand occur. An example of the former is this research and an example of the latter is NGOs' completion of emergency projects that may cause them to stop hiring or possibly layoff employees. Second, the data collected are from professional employers in the formal economy and omit salary information on employees of the informal labor market. The value of the data can be maintained, however, if it becomes a piece of a larger observational study focused on the developmental trends of the Haitian labor market.

This research is an attempt to bring new insights on the determinants and differentials of wages on the Haitian labor market. It could be further improved with the participation of non-Haitian government employers such as embassies and the inclusion of local government salary data. It may be also useful to add other data (employment statistics at the city level, cost of living information by city, GDP, levels of remittances and foreign aid, debt forgiveness, etc.), which affect employment and wages.

Sharing our research with organizations and foreign direct investors may help employers better understand labor costs and accelerate investment and employment in Haiti.

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## APPENDIX

### A. BACKGROUND OF THE HAITIAN ECONOMY

Each year the Department of Information and Statistics (ISHI), of the Ministry of Finance, publishes the report *Les Comptes Economiques* that summarizes the economic activity of the country for the prior year. The report measures the productivity of ten economic sectors, national inflation, and other economic indicators. The report estimated that in 2010 two sectors—Agriculture, Horticulture, & Fisheries, and Restaurants & Hotels—were responsible for 52% of the country's economic output.

The World Factbook<sup>8</sup>, which has detailed information on the Haitian economy and provides a thorough overview of the country's current economic condition.

- Haiti's GDP is growing. The economy has rebounded since the January 2010, earthquake razed the capital of Port-au-Prince. In 2010, the economy contracted by an estimated 5.1% and in 2011, grew by 6.1% to an estimated GDP of \$12.4B making it the 145<sup>th</sup> largest of the 226 economies tracked in the publication. Three economic sectors—services, agriculture, industry—contribute 59%, 25%, and 16%, respectively, to GDP.
- Poverty and unemployment are two issues that plague the population. Approximately 80% of the population lives below the poverty line, 54% in abject poverty. Two-thirds of all Haitians depend on the agricultural sector and its small-scale subsistence farming for survival. There is widespread unemployment and underemployment with approximately 60% of the workforce is employed, ranking it 186<sup>th</sup> in the world. The balance of the workforce is described as one-part *unemployed* and two-parts *inactive*.
- Waning national debt and reliance on significant international assistance remain issues for Haiti. In 2009, Haiti received debt forgiveness for over \$1B in money owed. In early 2010, after the earthquake, donor countries canceled the remainder of its outstanding external debt. Its debt has since risen to approximately \$0.5B by the end of 2011. The Haitian government relies on significant international assistance with over half of its annual budget coming from outside sources.
- Haiti is a net-importer of goods and services. Remittances are the primary source of foreign exchange equaling nearly 20% (\$2.5B) of GDP. The country has tariff-free access to the USA, which receives 90% of its exports of \$0.69B total exports and ranks Haiti the 163<sup>rd</sup> largest exporter in the world. Canada and France receive 4% and 2% of exports, respectively. The major exported commodities are apparel (75%), manufactured goods, oils, cocoa, mangoes, and coffee. The country imports \$3.3B, which is almost five times the value it exports, making it the world's 144<sup>th</sup> largest importer. The country's major imports are manufactured goods, machinery and transport equipment, fuels, and raw materials.

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<sup>8</sup> Central Intelligence Agency. "The World Factbook." 2012. The report is available at: <<https://www.cia.gov/library/publications/the-world-factbook/geos/ha.html>>.

## B. WAGES ESTIMATES BY SECTOR AND POSITION

PREDICTED SALARY ESTIMATES - by Sector of Economic Activity and Position (NGO Organizational Structure Type Only)												
The below table uses a statistical model to estimate salaries for all positions in all sectors while assuming an organizational structure type of, NGO. The reader can choose characteristics--i.e. Position (along the horizontal) and Economic Sector (along the vertical)--to specify of the salary query. All other salary drivers are calculated using the average among the 953 observations. E.g., for an NGO organization operating in the Banking Sector, the estimated salary offered to the Accountant position is \$23,329; the salary paid to the Mechanic position employed in the Manufacturing sector is \$6,586.												
	Accountant	Cleaning Crew	Cook	Doctor	Driver	Engineer	Executive	Handyman	IT Prof.	Laborer	Mechanic	
Sector of Economic Activity	Agriculture	\$ 29,315	\$ 5,163	\$ 6,886	\$ 75,907	\$ 11,069	\$ 23,789	\$ 65,195	\$ 7,875	\$ 28,478	\$ 6,953	\$ 18,210
	Airlines	\$ 11,682	\$ 2,058	\$ 2,744	\$ 30,249	\$ 4,411	\$ 9,480	\$ 25,980	\$ 3,138	\$ 11,348	\$ 2,771	\$ 7,257
	Banking	\$ 23,329	\$ 4,109	\$ 5,480	\$ 60,408	\$ 8,809	\$ 18,932	\$ 51,883	\$ 6,267	\$ 22,663	\$ 5,533	\$ 14,491
	Construction	\$ 16,593	\$ 2,923	\$ 3,898	\$ 42,964	\$ 6,265	\$ 13,465	\$ 36,901	\$ 4,457	\$ 16,119	\$ 3,936	\$ 10,307
	Education	\$ 10,415	\$ 1,834	\$ 2,447	\$ 26,968	\$ 3,933	\$ 8,452	\$ 23,162	\$ 2,798	\$ 10,117	\$ 2,470	\$ 6,469
	Gasoline	\$ 24,436	\$ 4,304	\$ 5,740	\$ 63,274	\$ 9,227	\$ 19,830	\$ 54,345	\$ 6,564	\$ 23,738	\$ 5,796	\$ 15,179
	Hotels & Lodging	\$ 10,937	\$ 1,926	\$ 2,569	\$ 28,319	\$ 4,130	\$ 8,875	\$ 24,323	\$ 2,938	\$ 10,624	\$ 2,594	\$ 6,794
	Humanitarian	\$ 12,355	\$ 2,176	\$ 2,902	\$ 31,990	\$ 4,665	\$ 10,026	\$ 27,476	\$ 3,319	\$ 12,002	\$ 2,930	\$ 7,674
	Int'l Development	\$ 11,186	\$ 1,970	\$ 2,628	\$ 28,964	\$ 4,224	\$ 9,077	\$ 24,877	\$ 3,005	\$ 10,866	\$ 2,653	\$ 6,948
	Medical	\$ 11,584	\$ 2,040	\$ 2,721	\$ 29,995	\$ 4,374	\$ 9,400	\$ 25,762	\$ 3,112	\$ 11,253	\$ 2,748	\$ 7,196
	Manufacturing	\$ 10,602	\$ 1,867	\$ 2,491	\$ 27,453	\$ 4,003	\$ 8,604	\$ 23,579	\$ 2,848	\$ 10,299	\$ 2,515	\$ 6,586
	Orphanage	\$ 4,612	\$ 812	\$ 1,083	\$ 11,941	\$ 1,741	\$ 3,742	\$ 10,256	\$ 1,239	\$ 4,480	\$ 1,094	\$ 2,865
	Other	\$ 14,053	\$ 2,475	\$ 3,301	\$ 36,387	\$ 5,306	\$ 11,404	\$ 31,252	\$ 3,775	\$ 13,651	\$ 3,333	\$ 8,729
	Retail	\$ 16,092	\$ 2,834	\$ 3,780	\$ 41,667	\$ 6,076	\$ 13,059	\$ 35,787	\$ 4,323	\$ 15,632	\$ 3,817	\$ 9,996
	Service	\$ 13,950	\$ 2,457	\$ 3,277	\$ 36,121	\$ 5,267	\$ 11,320	\$ 31,024	\$ 3,747	\$ 13,551	\$ 3,309	\$ 8,665
	Telecomm.	\$ 20,862	\$ 3,675	\$ 4,901	\$ 54,019	\$ 7,877	\$ 16,930	\$ 46,396	\$ 5,604	\$ 20,266	\$ 4,948	\$ 12,959
	Messenger	Office Staff	Nurse	Office Mgr.	Other	Program Mgr.	Secretary	Security Guard	Senior Mgr.	Teacher	Wait Staff	
Sector of Economic Activity	Agriculture	\$ 7,495	\$ 15,605	\$ 22,625	\$ 33,615	\$ 13,847	\$ 55,687	\$ 15,811	\$ 5,462	\$ 45,813	\$ 10,643	\$ 6,946
	Airlines	\$ 2,987	\$ 6,219	\$ 9,016	\$ 13,396	\$ 5,518	\$ 22,191	\$ 6,301	\$ 2,177	\$ 18,256	\$ 4,241	\$ 2,768
	Banking	\$ 5,965	\$ 12,419	\$ 18,006	\$ 26,752	\$ 11,019	\$ 44,316	\$ 12,583	\$ 4,347	\$ 36,458	\$ 8,470	\$ 5,528
	Construction	\$ 4,242	\$ 8,833	\$ 12,806	\$ 19,027	\$ 7,838	\$ 31,520	\$ 8,949	\$ 3,091	\$ 25,931	\$ 6,024	\$ 3,931
	Education	\$ 2,663	\$ 5,544	\$ 8,038	\$ 11,943	\$ 4,919	\$ 19,784	\$ 5,617	\$ 1,940	\$ 16,276	\$ 3,781	\$ 2,468
	Gasoline	\$ 6,248	\$ 13,008	\$ 18,860	\$ 28,021	\$ 11,542	\$ 46,419	\$ 13,180	\$ 4,553	\$ 38,188	\$ 8,871	\$ 5,790
	Hotels & Lodging	\$ 2,796	\$ 5,822	\$ 8,441	\$ 12,541	\$ 5,166	\$ 20,776	\$ 5,899	\$ 2,038	\$ 17,092	\$ 3,971	\$ 2,591
	Humanitarian	\$ 3,159	\$ 6,577	\$ 9,535	\$ 14,167	\$ 5,836	\$ 23,469	\$ 6,663	\$ 2,302	\$ 19,307	\$ 4,485	\$ 2,927
	Int'l Development	\$ 2,860	\$ 5,954	\$ 8,633	\$ 12,827	\$ 5,284	\$ 21,249	\$ 6,033	\$ 2,084	\$ 17,481	\$ 4,061	\$ 2,650
	Medical	\$ 2,962	\$ 6,166	\$ 8,941	\$ 13,283	\$ 5,472	\$ 22,005	\$ 6,248	\$ 2,158	\$ 18,103	\$ 4,205	\$ 2,745
	Manufacturing	\$ 2,711	\$ 5,644	\$ 8,183	\$ 12,157	\$ 5,008	\$ 20,140	\$ 5,718	\$ 1,975	\$ 16,569	\$ 3,849	\$ 2,512
	Orphanage	\$ 1,179	\$ 2,455	\$ 3,559	\$ 5,288	\$ 2,178	\$ 8,761	\$ 2,487	\$ 859	\$ 7,207	\$ 1,674	\$ 1,093
	Other	\$ 3,593	\$ 7,480	\$ 10,846	\$ 16,114	\$ 6,638	\$ 26,694	\$ 7,579	\$ 2,618	\$ 21,961	\$ 5,102	\$ 3,330
	Retail	\$ 4,114	\$ 8,566	\$ 12,420	\$ 18,452	\$ 7,601	\$ 30,568	\$ 8,679	\$ 2,998	\$ 25,148	\$ 5,842	\$ 3,813
	Service	\$ 3,567	\$ 7,426	\$ 10,767	\$ 15,996	\$ 6,589	\$ 26,499	\$ 7,524	\$ 2,599	\$ 21,800	\$ 5,064	\$ 3,305
	Telecomm.	\$ 5,334	\$ 11,105	\$ 16,101	\$ 23,922	\$ 9,854	\$ 39,629	\$ 11,252	\$ 3,887	\$ 32,602	\$ 7,574	\$ 4,943

## PREDICTED SALARY ESTIMATES - by Sector of Economic Activity and Position (For-Profit Organizational Structure Type Only)

The below table uses a statistical model to estimate salaries for all positions in all sectors while assuming an organizational structure type of, For-Profit. The reader can choose characteristics--i.e. Position (along the horizontal) and Economic Sector (along the vertical)--to specify of the salary query. All other salary drivers are calculated using the average among the 953 observations. E.g., for a For-Profit organization operating in the Banking Sector, the estimated salary offered to the Accountant position is \$18,959; the salary paid to the Mechanic position employed in the Manufacturing sector is \$5,352.

	Accountant	Cleaning Crew			Cook	Doctor	Driver	Engineer	Executive	Handyman	IT Prof.	Laborer	Mechanic
Sector of Economic Activity	Agriculture	\$ 23,824	\$ 4,196	\$ 5,596	\$ 61,688	\$ 8,995	\$ 19,333	\$ 52,983	\$ 6,400	\$ 23,143	\$ 5,651	\$ 14,799	
	Airlines	\$ 9,494	\$ 1,672	\$ 2,230	\$ 24,582	\$ 3,585	\$ 7,704	\$ 21,113	\$ 2,550	\$ 9,223	\$ 2,252	\$ 5,897	
	Banking	\$ 18,959	\$ 3,339	\$ 4,454	\$ 49,092	\$ 7,159	\$ 15,385	\$ 42,164	\$ 5,093	\$ 18,418	\$ 4,497	\$ 11,777	
	Construction	\$ 13,485	\$ 2,375	\$ 3,168	\$ 34,916	\$ 5,092	\$ 10,943	\$ 29,989	\$ 3,622	\$ 13,099	\$ 3,198	\$ 8,376	
	Education	\$ 8,464	\$ 1,491	\$ 1,988	\$ 21,916	\$ 3,196	\$ 6,868	\$ 18,823	\$ 2,274	\$ 8,222	\$ 2,008	\$ 5,258	
	Gasoline	\$ 19,859	\$ 3,498	\$ 4,665	\$ 51,421	\$ 7,498	\$ 16,115	\$ 44,165	\$ 5,335	\$ 19,291	\$ 4,710	\$ 12,336	
	Hotels & Lodging	\$ 8,888	\$ 1,566	\$ 2,088	\$ 23,014	\$ 3,356	\$ 7,213	\$ 19,767	\$ 2,388	\$ 8,634	\$ 2,108	\$ 5,521	
	Humanitarian	\$ 10,040	\$ 1,768	\$ 2,359	\$ 25,998	\$ 3,791	\$ 8,148	\$ 22,329	\$ 2,697	\$ 9,753	\$ 2,381	\$ 6,237	
	Int'l Development	\$ 9,090	\$ 1,601	\$ 2,135	\$ 23,538	\$ 3,432	\$ 7,377	\$ 20,217	\$ 2,442	\$ 8,831	\$ 2,156	\$ 5,647	
	Medical	\$ 9,414	\$ 1,658	\$ 2,211	\$ 24,376	\$ 3,555	\$ 7,639	\$ 20,936	\$ 2,529	\$ 9,145	\$ 2,233	\$ 5,848	
	Manufacturing	\$ 8,616	\$ 1,518	\$ 2,024	\$ 22,310	\$ 3,253	\$ 6,992	\$ 19,162	\$ 2,315	\$ 8,370	\$ 2,044	\$ 5,352	
	Orphanage	\$ 3,748	\$ 660	\$ 880	\$ 9,705	\$ 1,415	\$ 3,041	\$ 8,335	\$ 1,007	\$ 3,641	\$ 889	\$ 2,328	
	Other	\$ 11,420	\$ 2,012	\$ 2,683	\$ 29,571	\$ 4,312	\$ 9,267	\$ 25,398	\$ 3,068	\$ 11,094	\$ 2,709	\$ 7,094	
Retail	\$ 13,077	\$ 2,303	\$ 3,072	\$ 33,862	\$ 4,938	\$ 10,612	\$ 29,084	\$ 3,513	\$ 12,704	\$ 3,102	\$ 8,123		
Service	\$ 11,337	\$ 1,997	\$ 2,663	\$ 29,355	\$ 4,281	\$ 9,200	\$ 25,212	\$ 3,045	\$ 11,013	\$ 2,689	\$ 7,042		
Telecomm.	\$ 16,954	\$ 2,986	\$ 3,983	\$ 43,900	\$ 6,402	\$ 13,758	\$ 37,705	\$ 4,554	\$ 16,470	\$ 4,021	\$ 10,531		
	Messenger	Office Staff	Nurse	Office Mgr.	Other	Program Mgr.		Secretary	Security Guard	Senior Mgr.	Teacher	Wait Staff	
Sector of Economic Activity	Agriculture	\$ 6,091	\$ 12,682	\$ 18,387	\$ 27,318	\$ 11,253	\$ 45,255	\$ 12,849	\$ 4,439	\$ 37,231	\$ 8,649	\$ 5,645	
	Airlines	\$ 2,427	\$ 5,054	\$ 7,327	\$ 10,886	\$ 4,484	\$ 18,034	\$ 5,120	\$ 1,769	\$ 14,836	\$ 3,447	\$ 2,249	
	Banking	\$ 4,847	\$ 10,092	\$ 14,633	\$ 21,740	\$ 8,955	\$ 36,015	\$ 10,226	\$ 3,532	\$ 29,629	\$ 6,883	\$ 4,492	
	Construction	\$ 3,448	\$ 7,178	\$ 10,407	\$ 15,463	\$ 6,369	\$ 25,615	\$ 7,273	\$ 2,512	\$ 21,073	\$ 4,895	\$ 3,195	
	Education	\$ 2,164	\$ 4,505	\$ 6,532	\$ 9,706	\$ 3,998	\$ 16,078	\$ 4,565	\$ 1,577	\$ 13,227	\$ 3,073	\$ 2,005	
	Gasoline	\$ 5,077	\$ 10,571	\$ 15,327	\$ 22,772	\$ 9,380	\$ 37,724	\$ 10,711	\$ 3,700	\$ 31,035	\$ 7,210	\$ 4,705	
	Hotels & Lodging	\$ 2,272	\$ 4,731	\$ 6,860	\$ 10,192	\$ 4,198	\$ 16,884	\$ 4,794	\$ 1,656	\$ 13,890	\$ 3,227	\$ 2,106	
	Humanitarian	\$ 2,567	\$ 5,345	\$ 7,749	\$ 11,513	\$ 4,742	\$ 19,072	\$ 5,415	\$ 1,871	\$ 15,690	\$ 3,645	\$ 2,379	
	Int'l Development	\$ 2,324	\$ 4,839	\$ 7,016	\$ 10,424	\$ 4,294	\$ 17,268	\$ 4,903	\$ 1,694	\$ 14,206	\$ 3,300	\$ 2,154	
	Medical	\$ 2,407	\$ 5,011	\$ 7,266	\$ 10,795	\$ 4,447	\$ 17,883	\$ 5,078	\$ 1,754	\$ 14,712	\$ 3,418	\$ 2,231	
	Manufacturing	\$ 2,203	\$ 4,586	\$ 6,650	\$ 9,880	\$ 4,070	\$ 16,367	\$ 4,647	\$ 1,605	\$ 13,465	\$ 3,128	\$ 2,041	
	Orphanage	\$ 958	\$ 1,995	\$ 2,893	\$ 4,298	\$ 1,770	\$ 7,119	\$ 2,021	\$ 698	\$ 5,857	\$ 1,361	\$ 888	
	Other	\$ 2,920	\$ 6,079	\$ 8,814	\$ 13,095	\$ 5,394	\$ 21,694	\$ 6,160	\$ 2,128	\$ 17,847	\$ 4,146	\$ 2,706	
Retail	\$ 3,344	\$ 6,961	\$ 10,093	\$ 14,996	\$ 6,177	\$ 24,842	\$ 7,053	\$ 2,437	\$ 20,437	\$ 4,748	\$ 3,099		
Service	\$ 2,899	\$ 6,035	\$ 8,750	\$ 13,000	\$ 5,355	\$ 21,535	\$ 6,115	\$ 2,112	\$ 17,717	\$ 4,116	\$ 2,686		
Telecomm.	\$ 4,335	\$ 9,025	\$ 13,085	\$ 19,441	\$ 8,008	\$ 32,206	\$ 9,144	\$ 3,159	\$ 26,495	\$ 6,155	\$ 4,017		

## PREDICTED SALARY ESTIMATES - by Sector of Economic Activity and Position (Other Organizational Structure Type Only)

The below table uses a statistical model to estimate salaries for all positions in all sectors while assuming an organizational structure type of Other. The reader can choose characteristics—i.e. Position (along the horizontal) and Economic Sector (along the vertical)—to specify of the salary query. All other salary drivers are calculated using the average among the 953 observations. E.g., for a Other organization operating in the Banking Sector, the estimated salary offered to the Accountant position is \$17,019; the salary paid to the Mechanic position employed in the Manufacturing sector is \$4,804.

	Accountant	Cleaning Crew	Cook	Doctor	Driver	Engineer	Executive	Handyman	IT Prof.	Laborer	Mechanic	
Sector of Economic Activity	Agriculture	\$ 21,386	\$ 3,767	\$ 5,024	\$ 55,375	\$ 8,075	\$ 17,355	\$ 47,561	\$ 5,745	\$ 20,775	\$ 5,072	\$ 13,284
	Airlines	\$ 8,522	\$ 1,501	\$ 2,002	\$ 22,067	\$ 3,218	\$ 6,916	\$ 18,953	\$ 2,289	\$ 8,279	\$ 2,021	\$ 5,294
	Banking	\$ 17,019	\$ 2,998	\$ 3,998	\$ 44,068	\$ 6,426	\$ 13,811	\$ 37,849	\$ 4,572	\$ 16,533	\$ 4,037	\$ 10,572
	Construction	\$ 12,105	\$ 2,132	\$ 2,843	\$ 31,343	\$ 4,571	\$ 9,823	\$ 26,920	\$ 3,252	\$ 11,759	\$ 2,871	\$ 7,519
	Education	\$ 7,598	\$ 1,338	\$ 1,785	\$ 19,673	\$ 2,869	\$ 6,166	\$ 16,897	\$ 2,041	\$ 7,381	\$ 1,802	\$ 4,720
	Gasoline	\$ 17,827	\$ 3,140	\$ 4,188	\$ 46,159	\$ 6,731	\$ 14,466	\$ 39,645	\$ 4,789	\$ 17,317	\$ 4,228	\$ 11,073
	Hotels & Lodging	\$ 7,979	\$ 1,405	\$ 1,874	\$ 20,659	\$ 3,013	\$ 6,475	\$ 17,744	\$ 2,143	\$ 7,751	\$ 1,892	\$ 4,956
	Humanitarian	\$ 9,013	\$ 1,587	\$ 2,117	\$ 23,337	\$ 3,403	\$ 7,314	\$ 20,044	\$ 2,421	\$ 8,755	\$ 2,138	\$ 5,598
	Int'l Development	\$ 8,160	\$ 1,437	\$ 1,917	\$ 21,130	\$ 3,081	\$ 6,622	\$ 18,148	\$ 2,192	\$ 7,927	\$ 1,936	\$ 5,069
	Medical	\$ 8,451	\$ 1,488	\$ 1,985	\$ 21,882	\$ 3,191	\$ 6,858	\$ 18,794	\$ 2,270	\$ 8,209	\$ 2,004	\$ 5,249
	Manufacturing	\$ 7,734	\$ 1,362	\$ 1,817	\$ 20,027	\$ 2,920	\$ 6,276	\$ 17,201	\$ 2,078	\$ 7,513	\$ 1,835	\$ 4,804
	Orphanage	\$ 3,364	\$ 593	\$ 790	\$ 8,711	\$ 1,270	\$ 2,730	\$ 7,482	\$ 904	\$ 3,268	\$ 798	\$ 2,090
	Other	\$ 10,252	\$ 1,806	\$ 2,408	\$ 26,545	\$ 3,871	\$ 8,319	\$ 22,799	\$ 2,754	\$ 9,959	\$ 2,432	\$ 6,368
Retail	\$ 11,739	\$ 2,068	\$ 2,758	\$ 30,397	\$ 4,433	\$ 9,526	\$ 26,107	\$ 3,154	\$ 11,404	\$ 2,784	\$ 7,292	
Service	\$ 10,177	\$ 1,792	\$ 2,391	\$ 26,351	\$ 3,843	\$ 8,258	\$ 22,632	\$ 2,734	\$ 9,886	\$ 2,414	\$ 6,321	
Telecomm.	\$ 15,219	\$ 2,681	\$ 3,575	\$ 39,408	\$ 5,746	\$ 12,350	\$ 33,847	\$ 4,088	\$ 14,784	\$ 3,610	\$ 9,454	
	Messenger	Office Staff	Nurse	Office Mgr.	Other	Program Mgr.	Secretary	Security Guard	Senior Mgr.	Teacher	Wait Staff	
Sector of Economic Activity	Agriculture	\$ 5,468	\$ 11,384	\$ 16,506	\$ 24,523	\$ 10,101	\$ 40,624	\$ 11,535	\$ 3,985	\$ 33,421	\$ 7,764	\$ 5,067
	Airlines	\$ 2,179	\$ 4,537	\$ 6,577	\$ 9,772	\$ 4,025	\$ 16,189	\$ 4,597	\$ 1,588	\$ 13,318	\$ 3,094	\$ 2,019
	Banking	\$ 4,351	\$ 9,060	\$ 13,135	\$ 19,516	\$ 8,039	\$ 32,329	\$ 9,179	\$ 3,171	\$ 26,597	\$ 6,179	\$ 4,032
	Construction	\$ 3,095	\$ 6,444	\$ 9,342	\$ 13,880	\$ 5,718	\$ 22,994	\$ 6,529	\$ 2,255	\$ 18,917	\$ 4,395	\$ 2,868
	Education	\$ 1,943	\$ 4,044	\$ 5,864	\$ 8,712	\$ 3,589	\$ 14,433	\$ 4,098	\$ 1,416	\$ 11,874	\$ 2,758	\$ 1,800
	Gasoline	\$ 4,558	\$ 9,489	\$ 13,759	\$ 20,442	\$ 8,420	\$ 33,863	\$ 9,615	\$ 3,321	\$ 27,859	\$ 6,472	\$ 4,224
	Hotels & Lodging	\$ 2,040	\$ 4,247	\$ 6,158	\$ 9,149	\$ 3,769	\$ 15,156	\$ 4,303	\$ 1,487	\$ 12,469	\$ 2,897	\$ 1,890
	Humanitarian	\$ 2,304	\$ 4,798	\$ 6,956	\$ 10,335	\$ 4,257	\$ 17,121	\$ 4,861	\$ 1,679	\$ 14,085	\$ 3,272	\$ 2,135
	Int'l Development	\$ 2,086	\$ 4,344	\$ 6,298	\$ 9,357	\$ 3,854	\$ 15,501	\$ 4,401	\$ 1,520	\$ 12,752	\$ 2,962	\$ 1,933
	Medical	\$ 2,161	\$ 4,498	\$ 6,522	\$ 9,690	\$ 3,992	\$ 16,053	\$ 4,558	\$ 1,575	\$ 13,206	\$ 3,068	\$ 2,002
	Manufacturing	\$ 1,978	\$ 4,117	\$ 5,969	\$ 8,869	\$ 3,653	\$ 14,692	\$ 4,172	\$ 1,441	\$ 12,087	\$ 2,808	\$ 1,833
	Orphanage	\$ 860	\$ 1,791	\$ 2,597	\$ 3,858	\$ 1,589	\$ 6,391	\$ 1,815	\$ 627	\$ 5,258	\$ 1,221	\$ 797
	Other	\$ 2,621	\$ 5,457	\$ 7,912	\$ 11,755	\$ 4,842	\$ 19,474	\$ 5,529	\$ 1,910	\$ 16,021	\$ 3,722	\$ 2,429
Retail	\$ 3,001	\$ 6,249	\$ 9,060	\$ 13,461	\$ 5,545	\$ 22,300	\$ 6,332	\$ 2,187	\$ 18,346	\$ 4,262	\$ 2,781	
Service	\$ 2,602	\$ 5,417	\$ 7,854	\$ 11,669	\$ 4,807	\$ 19,332	\$ 5,489	\$ 1,896	\$ 15,904	\$ 3,695	\$ 2,411	
Telecomm.	\$ 3,891	\$ 8,101	\$ 11,746	\$ 17,452	\$ 7,189	\$ 28,910	\$ 8,209	\$ 2,836	\$ 23,784	\$ 5,525	\$ 3,606	

## PREDICTED SALARY ESTIMATES - by Sector of Economic Activity and Position (Government Organizational Structure Type Only)

The below table uses a statistical model to estimate salaries for all positions in all sectors while assuming an organizational structure type of, Government. The reader can choose characteristics--i.e. Position (along the horizontal) and Economic Sector (along the vertical)--to specify of the salary query. All other salary drivers are calculated using the average among the 953 observations. E.g., for a Government organization operating in the Banking Sector, the estimated salary offered to the Accountant position is \$15,141; the salary paid to the Mechanic position employed in the Manufacturing sector is \$4,274.

	Accountant	Cleaning Crew			Cook	Doctor	Driver	Engineer	Executive	Handyman	IT Prof.	Laborer	Mechanic
Sector of Economic Activity	Agriculture	\$ 19,026	\$ 3,351	\$ 4,469	\$ 49,264	\$ 7,184	\$ 15,439	\$ 42,312	\$ 5,111	\$ 18,482	\$ 4,513	\$ 11,818	
	Airlines	\$ 7,582	\$ 1,335	\$ 1,781	\$ 19,632	\$ 2,863	\$ 6,153	\$ 16,861	\$ 2,037	\$ 7,365	\$ 1,798	\$ 4,710	
	Banking	\$ 15,141	\$ 2,667	\$ 3,557	\$ 39,205	\$ 5,717	\$ 12,287	\$ 33,672	\$ 4,067	\$ 14,708	\$ 3,591	\$ 9,405	
	Construction	\$ 10,769	\$ 1,897	\$ 2,530	\$ 27,884	\$ 4,066	\$ 8,739	\$ 23,949	\$ 2,893	\$ 10,461	\$ 2,554	\$ 6,689	
	Education	\$ 6,759	\$ 1,191	\$ 1,588	\$ 17,502	\$ 2,552	\$ 5,485	\$ 15,032	\$ 1,816	\$ 6,566	\$ 1,603	\$ 4,199	
	Gasoline	\$ 15,859	\$ 2,793	\$ 3,725	\$ 41,065	\$ 5,988	\$ 12,870	\$ 35,270	\$ 4,260	\$ 15,406	\$ 3,762	\$ 9,851	
	Hotels & Lodging	\$ 7,098	\$ 1,250	\$ 1,667	\$ 18,379	\$ 2,680	\$ 5,760	\$ 15,786	\$ 1,907	\$ 6,895	\$ 1,684	\$ 4,409	
	Humanitarian	\$ 8,018	\$ 1,412	\$ 1,884	\$ 20,762	\$ 3,028	\$ 6,507	\$ 17,832	\$ 2,154	\$ 7,789	\$ 1,902	\$ 4,981	
	Int'l Development	\$ 7,260	\$ 1,279	\$ 1,705	\$ 18,798	\$ 2,741	\$ 5,891	\$ 16,145	\$ 1,950	\$ 7,052	\$ 1,722	\$ 4,509	
	Medical	\$ 7,518	\$ 1,324	\$ 1,766	\$ 19,467	\$ 2,839	\$ 6,101	\$ 16,720	\$ 2,020	\$ 7,303	\$ 1,783	\$ 4,670	
	Manufacturing	\$ 6,881	\$ 1,212	\$ 1,616	\$ 17,817	\$ 2,598	\$ 5,584	\$ 15,303	\$ 1,848	\$ 6,684	\$ 1,632	\$ 4,274	
	Orphanage	\$ 2,993	\$ 527	\$ 703	\$ 7,750	\$ 1,130	\$ 2,429	\$ 6,656	\$ 804	\$ 2,908	\$ 710	\$ 1,859	
	Other	\$ 9,120	\$ 1,606	\$ 2,142	\$ 23,615	\$ 3,444	\$ 7,401	\$ 20,283	\$ 2,450	\$ 8,860	\$ 2,163	\$ 5,665	
	Retail	\$ 10,444	\$ 1,840	\$ 2,453	\$ 27,042	\$ 3,943	\$ 8,475	\$ 23,226	\$ 2,805	\$ 10,145	\$ 2,477	\$ 6,487	
Service	\$ 9,054	\$ 1,595	\$ 2,127	\$ 23,443	\$ 3,418	\$ 7,347	\$ 20,135	\$ 2,432	\$ 8,795	\$ 2,147	\$ 5,624		
Telecomm.	\$ 13,540	\$ 2,385	\$ 3,181	\$ 35,059	\$ 5,112	\$ 10,987	\$ 30,111	\$ 3,637	\$ 13,153	\$ 3,211	\$ 8,410		
	Messenger	Office Staff	Nurse	Office Mgr.	Other	Program Mgr.	Secretary	Security Guard	Senior Mgr.	Teacher	Wait Staff		
Sector of Economic Activity	Agriculture	\$ 4,864	\$ 10,128	\$ 14,684	\$ 21,817	\$ 8,987	\$ 36,141	\$ 10,262	\$ 3,545	\$ 29,733	\$ 6,907	\$ 4,508	
	Airlines	\$ 1,938	\$ 4,036	\$ 5,852	\$ 8,694	\$ 3,581	\$ 14,402	\$ 4,089	\$ 1,413	\$ 11,848	\$ 2,752	\$ 1,796	
	Banking	\$ 3,871	\$ 8,060	\$ 11,686	\$ 17,362	\$ 7,152	\$ 28,761	\$ 8,166	\$ 2,821	\$ 23,662	\$ 5,497	\$ 3,587	
	Construction	\$ 2,753	\$ 5,732	\$ 8,311	\$ 12,348	\$ 5,087	\$ 20,456	\$ 5,808	\$ 2,006	\$ 16,829	\$ 3,910	\$ 2,552	
	Education	\$ 1,728	\$ 3,598	\$ 5,217	\$ 7,751	\$ 3,193	\$ 12,840	\$ 3,646	\$ 1,259	\$ 10,563	\$ 2,454	\$ 1,602	
	Gasoline	\$ 4,055	\$ 8,442	\$ 12,240	\$ 18,186	\$ 7,491	\$ 30,126	\$ 8,554	\$ 2,955	\$ 24,784	\$ 5,758	\$ 3,758	
	Hotels & Lodging	\$ 1,815	\$ 3,778	\$ 5,478	\$ 8,139	\$ 3,353	\$ 13,483	\$ 3,828	\$ 1,322	\$ 11,093	\$ 2,577	\$ 1,682	
	Humanitarian	\$ 2,050	\$ 4,268	\$ 6,188	\$ 9,194	\$ 3,787	\$ 15,231	\$ 4,325	\$ 1,494	\$ 12,530	\$ 2,911	\$ 1,900	
	Int'l Development	\$ 1,856	\$ 3,864	\$ 5,603	\$ 8,325	\$ 3,429	\$ 13,790	\$ 3,916	\$ 1,353	\$ 11,345	\$ 2,636	\$ 1,720	
	Medical	\$ 1,922	\$ 4,002	\$ 5,802	\$ 8,621	\$ 3,551	\$ 14,281	\$ 4,055	\$ 1,401	\$ 11,749	\$ 2,729	\$ 1,781	
	Manufacturing	\$ 1,759	\$ 3,663	\$ 5,311	\$ 7,890	\$ 3,250	\$ 13,071	\$ 3,711	\$ 1,282	\$ 10,753	\$ 2,498	\$ 1,630	
	Orphanage	\$ 765	\$ 1,593	\$ 2,310	\$ 3,432	\$ 1,414	\$ 5,686	\$ 1,614	\$ 558	\$ 4,677	\$ 1,087	\$ 709	
	Other	\$ 2,332	\$ 4,855	\$ 7,039	\$ 10,458	\$ 4,308	\$ 17,325	\$ 4,919	\$ 1,699	\$ 14,253	\$ 3,311	\$ 2,161	
	Retail	\$ 2,670	\$ 5,559	\$ 8,060	\$ 11,976	\$ 4,933	\$ 19,839	\$ 5,633	\$ 1,946	\$ 16,321	\$ 3,791	\$ 2,475	
Service	\$ 2,315	\$ 4,819	\$ 6,988	\$ 10,382	\$ 4,276	\$ 17,198	\$ 4,883	\$ 1,687	\$ 14,149	\$ 3,287	\$ 2,145		
Telecomm.	\$ 3,462	\$ 7,207	\$ 10,450	\$ 15,526	\$ 6,395	\$ 25,720	\$ 7,303	\$ 2,523	\$ 21,159	\$ 4,915	\$ 3,208		



## PREDICTED SALARY ESTIMATES - by Sector of Economic Activity and Position (Religious Organizational Structure Type Only)

The below table uses a statistical model to estimate salaries for all positions in all sectors while assuming an organizational structure type of, Religious. The reader can choose characteristics--i.e. Position (along the horizontal) and Economic Sector (along the vertical)--to specify of the salary query. All other salary drivers are calculated using the average among the 953 observations. E.g., for a Religious organization operating in the Banking Sector, the estimated salary offered to the Accountant position is \$13,552; the salary paid to the Mechanic position employed in the Manufacturing sector is \$3,826.

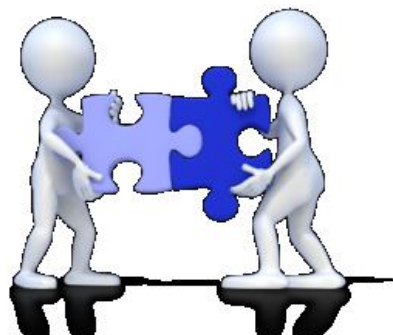
Employee Compensation by Sector and Activity													
	Accountant	Cleaning Crew			Cook	Doctor	Driver	Engineer	Executive	Handyman	IT Prof.	Laborer	Mechanic
Sector of Economic Activity	Agriculture	\$ 17,029	\$ 2,999	\$ 4,000	\$ 44,094	\$ 6,430	\$ 13,819	\$ 37,871	\$ 4,574	\$ 16,542	\$ 4,039	\$ 10,578	
	Airlines	\$ 6,786	\$ 1,195	\$ 1,594	\$ 17,571	\$ 2,562	\$ 5,507	\$ 15,092	\$ 1,823	\$ 6,592	\$ 1,610	\$ 4,215	
	Banking	\$ 13,552	\$ 2,387	\$ 3,183	\$ 35,090	\$ 5,117	\$ 10,997	\$ 30,138	\$ 3,640	\$ 13,165	\$ 3,214	\$ 8,418	
	Construction	\$ 9,639	\$ 1,698	\$ 2,264	\$ 24,958	\$ 3,639	\$ 7,822	\$ 21,436	\$ 2,589	\$ 9,363	\$ 2,286	\$ 5,987	
	Education	\$ 6,050	\$ 1,066	\$ 1,421	\$ 15,665	\$ 2,284	\$ 4,910	\$ 13,455	\$ 1,625	\$ 5,877	\$ 1,435	\$ 3,758	
	Gasoline	\$ 14,195	\$ 2,500	\$ 3,334	\$ 36,755	\$ 5,360	\$ 11,519	\$ 31,569	\$ 3,813	\$ 13,789	\$ 3,367	\$ 8,817	
	Hotels & Lodging	\$ 6,353	\$ 1,119	\$ 1,492	\$ 16,450	\$ 2,399	\$ 5,156	\$ 14,129	\$ 1,707	\$ 6,172	\$ 1,507	\$ 3,946	
Sector of Economic Activity	Humanitarian	\$ 7,177	\$ 1,264	\$ 1,686	\$ 18,583	\$ 2,710	\$ 5,824	\$ 15,960	\$ 1,928	\$ 6,972	\$ 1,702	\$ 4,458	
	Int'l Development	\$ 6,498	\$ 1,144	\$ 1,526	\$ 16,825	\$ 2,453	\$ 5,273	\$ 14,451	\$ 1,745	\$ 6,312	\$ 1,541	\$ 4,036	
	Medical	\$ 6,729	\$ 1,185	\$ 1,581	\$ 17,424	\$ 2,541	\$ 5,461	\$ 14,965	\$ 1,808	\$ 6,537	\$ 1,596	\$ 4,180	
	Manufacturing	\$ 6,159	\$ 1,085	\$ 1,447	\$ 15,947	\$ 2,325	\$ 4,998	\$ 13,697	\$ 1,654	\$ 5,983	\$ 1,461	\$ 3,826	
	Orphanage	\$ 2,679	\$ 472	\$ 629	\$ 6,937	\$ 1,012	\$ 2,174	\$ 5,958	\$ 720	\$ 2,602	\$ 635	\$ 1,664	
	Other	\$ 8,163	\$ 1,438	\$ 1,918	\$ 21,137	\$ 3,082	\$ 6,624	\$ 18,154	\$ 2,193	\$ 7,930	\$ 1,936	\$ 5,071	
	Retail	\$ 9,348	\$ 1,646	\$ 2,196	\$ 24,204	\$ 3,530	\$ 7,586	\$ 20,789	\$ 2,511	\$ 9,081	\$ 2,217	\$ 5,806	
Sector of Economic Activity	Service	\$ 8,103	\$ 1,427	\$ 1,904	\$ 20,982	\$ 3,060	\$ 6,576	\$ 18,021	\$ 2,177	\$ 7,872	\$ 1,922	\$ 5,034	
	Telecomm.	\$ 12,119	\$ 2,135	\$ 2,847	\$ 31,379	\$ 4,576	\$ 9,834	\$ 26,951	\$ 3,255	\$ 11,772	\$ 2,874	\$ 7,528	
		Messenger	Office Staff	Nurse	Office Mgr.	Other	Program Mgr.	Secretary	Security Guard	Senior Mgr.	Teacher	Wait Staff	
	Agriculture	\$ 4,354	\$ 9,065	\$ 13,143	\$ 19,527	\$ 8,044	\$ 32,348	\$ 9,185	\$ 3,173	\$ 26,612	\$ 6,182	\$ 4,035	
	Airlines	\$ 1,735	\$ 3,612	\$ 5,237	\$ 7,781	\$ 3,205	\$ 12,891	\$ 3,660	\$ 1,264	\$ 10,605	\$ 2,464	\$ 1,608	
	Banking	\$ 3,465	\$ 7,214	\$ 10,459	\$ 15,540	\$ 6,401	\$ 25,743	\$ 7,309	\$ 2,525	\$ 21,178	\$ 4,920	\$ 3,211	
	Construction	\$ 2,464	\$ 5,131	\$ 7,439	\$ 11,053	\$ 4,553	\$ 18,309	\$ 5,199	\$ 1,796	\$ 15,063	\$ 3,499	\$ 2,284	
Sector of Economic Activity	Education	\$ 1,547	\$ 3,220	\$ 4,669	\$ 6,937	\$ 2,858	\$ 11,492	\$ 3,263	\$ 1,127	\$ 9,455	\$ 2,196	\$ 1,433	
	Gasoline	\$ 3,629	\$ 7,556	\$ 10,956	\$ 16,277	\$ 6,705	\$ 26,964	\$ 7,656	\$ 2,645	\$ 22,183	\$ 5,153	\$ 3,363	
	Hotels & Lodging	\$ 1,624	\$ 3,382	\$ 4,903	\$ 7,285	\$ 3,001	\$ 12,068	\$ 3,427	\$ 1,184	\$ 9,928	\$ 2,306	\$ 1,505	
	Humanitarian	\$ 1,835	\$ 3,820	\$ 5,539	\$ 8,229	\$ 3,390	\$ 13,633	\$ 3,871	\$ 1,337	\$ 11,215	\$ 2,605	\$ 1,700	
	Int'l Development	\$ 1,661	\$ 3,459	\$ 5,015	\$ 7,451	\$ 3,069	\$ 12,343	\$ 3,505	\$ 1,211	\$ 10,154	\$ 2,359	\$ 1,540	
	Medical	\$ 1,720	\$ 3,582	\$ 5,193	\$ 7,716	\$ 3,178	\$ 12,783	\$ 3,629	\$ 1,254	\$ 10,516	\$ 2,443	\$ 1,594	
	Manufacturing	\$ 1,575	\$ 3,278	\$ 4,753	\$ 7,062	\$ 2,909	\$ 11,699	\$ 3,322	\$ 1,147	\$ 9,625	\$ 2,236	\$ 1,459	
Sector of Economic Activity	Orphanage	\$ 685	\$ 1,426	\$ 2,068	\$ 3,072	\$ 1,265	\$ 5,089	\$ 1,445	\$ 499	\$ 4,187	\$ 973	\$ 635	
	Other	\$ 2,087	\$ 4,345	\$ 6,300	\$ 9,360	\$ 3,856	\$ 15,506	\$ 4,403	\$ 1,521	\$ 12,757	\$ 2,964	\$ 1,934	
	Retail	\$ 2,390	\$ 4,976	\$ 7,214	\$ 10,719	\$ 4,415	\$ 17,757	\$ 5,042	\$ 1,742	\$ 14,608	\$ 3,394	\$ 2,215	
	Service	\$ 2,072	\$ 4,314	\$ 6,254	\$ 9,292	\$ 3,828	\$ 15,393	\$ 4,371	\$ 1,510	\$ 12,664	\$ 2,942	\$ 1,920	
	Telecomm.	\$ 3,098	\$ 6,451	\$ 9,353	\$ 13,896	\$ 5,724	\$ 23,020	\$ 6,536	\$ 2,258	\$ 18,938	\$ 4,400	\$ 2,871	

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## Attachment 1.1 – Organizational Survey

Company Survey.docx

Studying the Salaries of the Haitian Labor Market



Organization Name: \_\_\_\_\_

Number of Haitian-based Employees: \_\_\_\_\_

Annual Budget of Operations in Haiti (approximate): \_\_\_\_\_

Primary Focus of Organization's Activities (please select one):

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Agriculture/Farming         | <input type="checkbox"/> Hotel and Lodging         | <input type="checkbox"/> Religious              |
| <input type="checkbox"/> Banking/Finance             | <input type="checkbox"/> Humanitarian              | <input type="checkbox"/> Retail Sales           |
| <input type="checkbox"/> Construction                | <input type="checkbox"/> International Development | <input type="checkbox"/> Telecommunication      |
| <input type="checkbox"/> Consumer Product Production | <input type="checkbox"/> Medical                   | <input type="checkbox"/> Services               |
| <input type="checkbox"/> Education                   | <input type="checkbox"/> Orphanage                 | <input type="checkbox"/> Other (explain): _____ |
| <input type="checkbox"/> Government                  |  |   |

Markets Served:

- ☐ Local      ☐ National      ☐ Regional/Caribbean\*      ☐ International  
(\* CARICOM trade bloc)

Organizational Structure:

- ☐ For-Profit      ☐ Government      ☐ NGO      ☐ Religious      ☐ Other\*  
(\* Foundation, Non-Profit Association, etc.)

Country of Origin:

- ☐ Dominican      ☐ Haitian      ☐ International\*      ☐ U.S.  
(\* if country is not listed)

Years Operating in Haiti:

\_\_\_\_\_ years

Contact Name: \_\_\_\_\_

Cell: \_\_\_\_\_

Office: \_\_\_\_\_

Email(s): \_\_\_\_\_

Anthony J. DeMattee

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## Attachment 1.2 – Organizational Survey

Company Position Survey.docx | Studying the Salaries of the Haitian Labor Market |

Organization Name: \_\_\_\_\_ Position Title: \_\_\_\_\_

Position Type Please select the general position type that best describes this position. If one is not listed please add it to the list.	Office Staff 1 Accountant 2 Doctor 3 Mechanic 4 Nurse 5 Office Manager 6 Senior Manager 7 Teacher/Educator 8 Other (explain): _____	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills
Salary Range Comparison How do changes in the salary range of employees from the low to the high end of the salary range?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills
1) 12 Month Salary (USD) If applicable, please include 13 <sup>th</sup> month bonus, annual value of any other bonus, and on value of expat package.	12 month Salary: \$ _____ 13 <sup>th</sup> month Bonus: \$ _____ Annual Bonus: \$ _____ Exp-Pat Package: \$ _____	12 month Salary: \$ _____ 13 <sup>th</sup> month Bonus: \$ _____ Annual Bonus: \$ _____ Exp-Pat Package: \$ _____
2) Two Year Job Security Assuming adequate job security, how long would this position will exist two years from now?	1 Much Security 2 Some Security 3 Zero Security	1 Much Security 2 Some Security 3 Zero Security
3) Site of Employment In what type of environment will the candidate work? What type of resources will be available?	Environment 1 Large Urban 2 Medium Urban 3 Rural	Environment 1 Large Urban 2 Medium Urban 3 Rural
4) Training in School or on the Job	Resources 1 Adds Much 2 Adds Little 3 No Change 4 Deducts Little 5 Deducts Much	Resources 1 Adds Much 2 Adds Little 3 No Change 4 Deducts Little 5 Deducts Much

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Company Position Survey.docx | Studying the Salaries of the Haitian Labor Market |

Organization Name: \_\_\_\_\_ Position Title: \_\_\_\_\_

Position Type Please select the general position type that best describes this position. If one is not listed please add it to the list.	Office Staff 1 Accountant 2 Doctor 3 Mechanic 4 Nurse 5 Office Manager 6 Senior Manager 7 Teacher/Educator 8 Other (explain): _____	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills
1) Years in the Position How many years did this candidate spend working in this position (perhaps at another organization) prior to hire?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills
2) Level of Trust How much do you trust the new employee? Trust is built during the interview or through personal and/or professional relationships.	High Trust Some Trust Little or No Trust	High Trust Some Trust Little or No Trust
3) Supervision Required How much time and energy will be required to supervise this candidate?	Constant Supervision Daily to Weekly Supervision Weekly to Biweekly Supervision Monthly Supervision Less frequently than Monthly	Constant Supervision Daily to Weekly Supervision Weekly to Biweekly Supervision Monthly Supervision Less frequently than Monthly
4) Supervisees Others Is this candidate expected to manage others? If so, approximately how many people?	Yes, supervises others No, does not supervise others	Yes, supervises others No, does not supervise others
5) Home Country What is the expected nationality of this candidate?	Haitian Non-American American	Haitian Non-American American

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Organization Name: \_\_\_\_\_ Position Title: \_\_\_\_\_

Position Type Please select the general position type that best describes this position. If one is not listed please add it to the list.	Office Staff 1 Accountant 2 Doctor 3 Mechanic 4 Nurse 5 Office Manager 6 Senior Manager 7 Teacher/Educator 8 Other (explain): _____	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills
5) Physical Risk How much physical risk is assumed in this position?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	
6) Tax Burden Reasonable ability to pay taxes but still must comply with requirements for Haitian and foreign employees. Some pay more than their legal obligations. What are the tax obligations does your organization pay?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	
7) Level Within Firm What is the estimated number of employees in this candidate's hierarchy will this candidate work per week?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	
8) Hours Worked Per Week What is the estimated number of hours per week is expected to work per week?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	
9) Years of Related Work Experience Prior to hire, how many years of related work experience is this candidate expected to have?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	

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Organization Name: \_\_\_\_\_ Position Title: \_\_\_\_\_

Position Type Please select the general position type that best describes this position. If one is not listed please add it to the list.	Office Staff 1 Accountant 2 Doctor 3 Mechanic 4 Nurse 5 Office Manager 6 Senior Manager 7 Teacher/Educator 8 Other (explain): _____	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills
10) Education Level What is the education level this candidate is expected to have completed?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	
11) Specialized Training What amount of specialized training is the candidate expected to possess prior to hire?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	
12) Computer Literacy What amount of computer literacy is this candidate expected to possess prior to hire?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	
13) Educated Abroad Is it expected that this candidate be educated abroad?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	
14) Language Proficiency What are the language proficiency expectations for this candidate?	Acceptable Applicant Least desirable but still employable. Barely meets qualifications required of the position and organization	Perfect Applicant Most desirable and earns highest pay available. Meets position's qualifications with highest desired training, experience, and skills	

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# THE DETERMINANTS OF GEOGRAPHICAL LOCATION OF FDI: AN EMPIRICAL ANALYSIS IN CHINA

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**Abstract:** This study conducts an empirical analysis on the determinants of FDI regional distribution in China. The dataset used for this study spans from 1990-2008 and involves regional-level data from 300 cities in China. The key findings of this paper can be summarized as follows: at regional level, foreign investors base their investment decisions by tax rates, geography, labor costs and market size. Moreover, tax incentive effects are proved to be greater in the eastern areas than in the western areas. This study provides some valuable insights into foreign investors' decision making and the economic costs/benefits of FDI, which have important implications for scholars, practitioners and policy makers alike.

**Keywords:** FDI, Location, Tax Incentives, Decision Making

## 1. INTRODUCTION

Today, the role of foreign direct investment in the global economy is becoming increasingly important with market integration and globalization. Many countries take different measures to attract FDI. Consequently, the effects of tax and non-tax factors on FDI have become an interesting research topic in the last twenty years. Several previous studies (Hartman, 1981 and 1984; Boskin and Gale, 1987; Slemrod, 1990) have demonstrated that domestic tax rates are at least partially responsible for FDI inflows by using time-series models. In addition, some other prior studies, such as Papke (1987), Hines (1995) and Billington (1999), tested the relationships between tax/non-tax factors and the regional distribution of FDI. Most of their results show that tax rates significantly affect the allocation of FDI. However, the majority of these studies in this area are focused on developed market and few of them consider developing countries and China in particular.

China has been one of the most popular countries for FDI in the last two decades. For most of the 1990s China counted for over 50% of FDI inflows into developing countries, and has been the second largest recipient of FDI in the world since 1994 (Huang, 2003). Clearly, the Chinese Government has achieved great success in attracting FDI since the 'opening up' policy started in 1978 especially since the tax reforms in the 1990s. Therefore, it provides a good example for research into the relationship between FDI and tax incentives.

Throughout the 1980s, different corporate income tax laws and different tax rates were applied to three different forms of FDI<sup>1</sup>. Due to economic development and ever-increasing competition in the global market, the Chinese Government published the new corporate income tax law in 1991 to unify income tax regimes for all forms of FDI<sup>2</sup>, which granted more concessionary tax rates to foreign invested enterprises (FIEs). At the same time, a number of tax incentive zones have been set up gradually by the Chinese Government since early

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<sup>1</sup> These are equity joint ventures, contractual joint ventures and wholly foreign owned enterprises.

<sup>2</sup> National People's Congress (1991).

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1980s. In addition, China has experienced fundamental changes and reforms including its policy, investment environment, infrastructure, education, and so on.

The aim of this paper is to investigate what factors will significantly affect FDI location choice decisions in China using a sample of 300 cities in China from 1990-2008. This aim will be examined by the following objectives:

- i. Investigate the extent to which the Chinese Government's incentive policies for FDI (such as concessionary tax rates and special tax incentive zones) have significant effects on the regional distribution of FDI in China.
- ii. Examine the role of other factors besides tax policies (such as infrastructure, market size, labor costs and availability, education, regional differences, etc.) in influencing the location decisions of FDI in China.
- iii. Examine whether or not the concessionary tax rates have similar impacts on the eastern and western cities in China.

The rest of the paper is organized as follows. Section 2 discusses the theory of FDI location choice and the background of China's tax incentives. Section 3 is a review of related previous studies. Section 4 lays out the theoretical foundation of FDI location choice decisions. Section 5 develops the hypotheses and the empirical methodology used to test them. Section 6 describes the data source and sample statistics. Section 7 presents the empirical results. The final section concludes the paper.

## 2. LITERATURE AND BACKGROUND OF FDI IN CHINA

### 2.1. Tax incentives for FDI

China has achieved considerable success in attracting FDI since its opening to the outside world in 1979. Undoubtedly, the tax incentive policies taken by the Chinese Government have played a very important role in attracting FDI inflows. This section will discuss the background of this research. It introduces the concessionary income tax regimes for foreign invested enterprises and the development of the special tax incentive zones in China since early 1980s.

#### 2.1.1. Income tax laws for different forms of FDI

There are three main forms of FDI in China: equity joint ventures, contractual joint ventures and wholly foreign-owned enterprises. Table 1 outlines the differences between each form, which is summarized from the detailed discussion in Paper 2. Both equity joint ventures and contractual joint ventures involve investments by both domestic and foreign participants. The former requires joint investment and management, and the sharing of profits and losses according to the proportion of their investment. The latter would usually involve a formal contract for the cooperation and an agreed share of the profits and losses according to the venture contract. Wholly foreign-owned enterprises are set up by the foreign companies using their own capital and all the risks, gains and losses are self-financed. Other forms of investments include compensation trade<sup>3</sup>, processing trade<sup>4</sup> and assembling trade<sup>5</sup> which only occupy a small proportion of total amount of FDI in China so are not the main concerns

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<sup>3</sup> Under a compensation trade arrangement, the Chinese provide the plant and labor while the foreign firm provides the technology, equipment, technical expertise, and management.

<sup>4</sup> Processing trade refers to the business activity of importing all or part of the raw and auxiliary materials, parts and components, accessories, and packaging materials from abroad in bond, and re-exporting the finished products after processing or assembly by enterprises within the mainland. It includes processing with supplied materials and processing with imported materials.

<sup>5</sup> Assembling trade is very similar to processing trade, but assemble parts for the clients and process according to the clients' samples.

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for this study.

**Table 1: Different forms of FDI in China**

	<b>Equity joint ventures</b>	<b>Contractual joint ventures</b>	<b>Wholly foreign-owned enterprises</b>
<b>Organization forms</b>	Limited liability corporations	May or may not form as legal entities	Corporation or other forms of legal entities
<b>Investment</b>	jointly investment and management; require 25% foreign minimum participation	No minimum foreign participation requirement	Established by foreign companies using their own capital, technologies and management entirely
<b>Profit and loss distribution</b>	Losses and profits are shared according to the proportion of investment	Losses and profits are shared according to the venture contract	Response for all the risks, gains and losses by themselves

**Source:** National People's Congress (1991)

Throughout the 1980s, different corporate income tax laws were applied to three different forms of FDI. In order to create a more friendly investment environment and to encourage overseas firms to invest in China, the Chinese Government unified the corporate income tax laws by introducing the '*Income Tax Law for Enterprises with Foreign Investment and Foreign Enterprise*' in 1991<sup>6</sup>. This law replaced both the 1980 and 1981 tax laws which imposed the same tax rates and incentives to all three forms of FDI. Under the new legislation, foreign invested enterprises are charged at a base rate of 30% with a possible surcharge of 3% at the discretion of local authorities. However, FIEs are able to take advantage of an extensive range of incentives according to different economic sectors and geographical areas. Table 2 shows the detailed tax incentives for different forms of FIEs. Firms in the manufacturing sector can be exempted from paying any tax for the first two years of making an operating profit and a 50% reduction in the standard tax rate for three years thereafter. In addition, other tax benefits to foreign firms include a further reduction in income tax of 15% to 30% for ten additional years after the initial five years for firms engaged in low-profit operations and located in underdeveloped areas, and a refund of up to 40% of the income tax paid on the amount of profits if the FIE reinvest its share of profit in China for a period of five years or more. Furthermore, firms located in designated special tax incentive zones such as Special Economic Zones, Economic and Technological Development Zones or Open Coastal Cities may be eligible for a concessionary tax rate at the base of 15% or 24%.

**Table 2: Tax incentive for FIEs**

<b>Types of FIE</b>	<b>Tax Incentives</b>
FIE engaged in manufacturing sector	Exemption from income tax for the first two-profit-year and a 50% reduction for 3years thereafter;
Firms engaged in low-profit operations and located in underdeveloped areas	A further reduction in income tax of 15%-30% for 10 additional years following the initial 5 years tax concession period;
For export-oriented FIE	Reduction of 50% in income tax if they export more than 70% of their total production value
Designated special tax incentive zones	Offer a concessionary tax rate of 15% or 24%
For firms reinvest its profits to increase capital	Refund of 40% of the income tax paid on the amount of reinvested profits

**Source:** Economist Intelligence Unit (1997); Tung and Cho (2000); Income tax Law for Enterprises with Foreign Investment and Foreign Enterprise (1991).

<sup>6</sup> National People's Congress (1991).

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## 2.1.2. Special tax incentive zones in China

In 1979, the Chinese Government established the policy of 'reform and opening up'. As a result, in the twenty years that followed, a number of special tax incentive cities and zones have been set up to attract FDI as a reaction to the 'opening-up' policy. Those tax incentive cities and zones offer more liberal investment and trade regimes than other areas, as well as special concessionary tax rates of 15% or 24% to FIEs. Since then, they have played an important role in attracting FDI and made great contributions to the economic development of China.

Table 3 presents the opening years and tax rates applied for different tax incentives zones. In 1980, China opened four coastal cities in the south (Shenzhen, Zhuhai, Shantou and Xiamen) as Special Economic Zones which marked the first steps of 'opening up'. Hainan province became the fifth Special Economic Zone in 1988. In 1984, another 14 coastal cities (Dalian, Qinhuangdao, Tianjin, Yantai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Wenzhou, Fuzhou, Guangzhou, Zhanjiang, Beihai) were opened to foreign investors in order to attract foreign capital and advanced technology and management. In the following year (1985), three areas were designed as Economic Coastal Open Zones including the Yangze River delta, the Pearl River delta and the Zhangzhou-Quanzhou-Xiamen region. Furthermore, two more peninsulas were included into the Coastal Open Zones in 1988. Those Coastal Open Zones cover 10 provinces from the north to south (Guangdong, Fujian, Zhejiang, Jiangsu, Shanghai, Shandong, Tianjin, Hebei, Liaoning, Guangxi). In June 1990, the Shanghai Pudong New Area was opened to overseas investments. In 1992, the Chinese Government took further steps to open 18 Provincial Capital (Urumchi, Nanning, Kunming, Harbin, Changchun, Huhehot, Shijiazhuang, Taiyuan, Hefei, Nanchang, Zhengzhou, Changsha, Guiyang, Xi'an, Lanzhou, Xining, Yinchuan, Chengdu) and six cities (Wuhan, Wuhu, Hongqing, Yueyang, Jiujiang, Huangshi) along the Yangze River as well as 13 Border Open Cities (Heihe, Suifenhe, Hunchun, Manzhouli, Erenhot, Yining, Tacheng, Bodong, Pingxiang, Wanding, Hekou shi, Ruilixian, Dongxingzhen). Moreover, since 1992 the Chinese Government has set up many Economic and Technology Development Zones and New and High Technology Industrial Development Zones in order to encourage the development of high-technology industries. In 2000, as the strategy of encouraging western development was implemented, opening-up expanded further to the western region of China. Thus, a pattern of multi-dimensional development of open regions has been shaped. Now China has formed a multi-level, multi-channel and all-direction pattern of economic liberalization which integrates coastal areas, border and inland areas. And the special tax incentives cities and zones have been expanded from the south to the north and from the coastal regions to the inner and western parts of China.

Those tax incentive cities and zones play a crucial role in attracting FDI and promoting the development of China's economy. Within a short period of 30 years, the total volume of FDI in China has experienced a dramatic increase from almost zero in 1978 to USD74.8 billion<sup>7</sup> in 2007. China has become one of the largest recipient countries of FDI, and ranked the first among developing countries for 16 consecutive years.

However, FDI is unevenly distributed across China. Most of FDI is still located in the eastern and coastal areas of China, which account for about 85% of the total amount of FDI. The inner and western areas of China only account for 7.6% and 6.0%, respectively. Chen *et al.* (1995) suggested that the unbalanced distribution of FDI can be explained by many factors such as degree of openness, infrastructure, population etc. Sun *et al.* (2002) argued that main driver of FDI in China is the potential market for foreign products and low labor costs, rather than natural resources.

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<sup>7</sup> Measured in actually-utilized investment.

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**Table 3: Investment incentive zones and their concessionary tax rates**

<b>Tax incentive zones</b>	<b>Year of opening</b>	<b>Concessionary tax rates</b>
Special Economic Zones (5 zones)	1980, 1988	15% for all FIEs
Coastal Open cities (14 cities)	1984	24% for FIEs in production industries
Economic Coastal Open Zones (10 cities)	1985, 1988	24% for FIEs in production industries
Economic and Technology development Zones (32 cities)	Since 1992	15% for FIEs in production industries
New and high Technology industrial Development Zones (52 zones)	Since 1992	15% for FIEs in high-technology industries
Provincial capitals and Open cities along Yangtze River (24 cities)	1992	24% for FIEs in production industries
Border Open cities (13 cities)	1992	24% for FIEs in production industries

**Source:** Cho and Tung (1998)

## 2.2 Review of Related Previous Studies

This Section provides a review of previous studies on the determinants of FDI location choice, including tax and non-tax factors.

### 2.2.1. Tax and FDI inflows

There are different views from previous empirical research on tax rates and FDI inflows. Whilst some studies have found tax rates to be significantly related to FDI inflows (Hartman, 1984; Slemrod, 1990), others have found limited evidence on the effect of tax incentives compared to factors such as labor costs, infrastructure and market size (Barlow and Wender, 1955; Aharoni, 1966; Root and Ahmed, 1978; Lim, 1983). On the other hand, most cross-country empirical studies indicate that tax rate factors have a significant impact on the regional distribution of FDI in a country (Forsyth, 1972; Moore *et al.* 1987; Hines, 1995).

The literature on taxation and FDI starts with Hartman (1984) as he was the first to point out the different tax relationships between FDI financed out of retained earnings and the transfer of funds. Hartman argued that retained earnings should be more sensitive to taxes because mature firms will want to use retained earnings to the largest extent as the marginal source of finance. This is because the costs of funding from retained earnings are lower than the transfer of new funds, therefore FDI through retained earnings should only respond to host country tax rates not parent country tax rates. Hartman (1984) measured the FDI inflows in the US as a ratio of GNP, and separately analyzed FDI financed by retained earnings and the transfer of new funds based on his hypothesis. The result of this study is consistent with the hypothesis that only FDI from retained earnings responds significantly to host country tax rates. After Hartman's research, many subsequent papers have extended, modified or criticized Hartman's model such as Boskin and Gale (1987), Newlon (1987), Young (1988), and Murthy (1989). Jun (1989) also developed his research on the theory of Hartman (1984). However, different from other studies, he investigated the relationship between home country tax rates and direct investments abroad, and found that an increase in the home country tax rate will have a positive effect on direct investments abroad.



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Slemrod (1990) criticized the earlier studies based on an alternative methodology. This paper extends and updates Hartman's model by replacing a measure of average tax rates with a measure of marginal effective tax rates. Slemrod argued that the tax systems of both host country and home country should have effects on the incentives concerning FDI. In particular, he suggested that the tax sensitivity of investors from credit countries (Japan, UK and Italy) should be different from those from exemption countries (Germany, the Netherlands, Canada and France). To explore this hypothesis, Slemrod considered the bilateral investment flows from seven industrialized countries with the US to examine the systematic differences between the two types of investors.

Many subsequent studies during the 1990s have adopted Slemrod's model on bilateral FDI flows using aggregate time series (e.g. Grubert and Mutti, 1991; He and Guisinger, 1993; Hines and Rice, 1994). Meanwhile, other studies have focused on the effect of the changes in tax laws on corporate activities (e.g. Scholes and Wolfson, 1990; Swenson, 1994; Jun, 1994;). Hines (1995) further extended the previous research using data on individual countries' FDI into the US. This study takes into consideration the double tax relief and differences in international tax systems. Hines found that high state tax rates have a significantly negative effect on foreign investment decisions in the US and moreover, state taxes significantly influence the pattern of FDI.

### 2.2.2. The Theory of FDI Allocation Decisions

The motivation of multinational enterprises (MNEs) to invest in foreign countries or regions are diverse. FDI theory states that the location decisions of MNEs are determined by "the relative location advantages of particular countries for certain activities". In the mainstream academic literature, FDI may be divided into two categories: market-oriented FDI and resource-oriented FDI. For market-oriented FDI, which usually occurs in developed countries, the motivation for MNEs' overseas investments is the size of market and the potential market for development in the host country. Usually, the market size can be measured by the host area's total income or GDP: the larger the GDP the greater of the size of the potential market. Wheeler and Mody (1992) and Milner and Pentecost (1994) are two major examples concerning the market size of host countries. They believed that seeking new markets for products is the main reason for multinational corporations to invest overseas.

For resource-oriented FDI, the purpose of overseas investments is the low cost of certain resources, which fall into three categories: infrastructure, labor and natural resources. For this type of foreign investment, market size in the host country is less important in the sense that most products will return to the home country or be exported to other areas. Resource-orientated investments usually occur in emerging markets. Existing studies on resource-oriented FDI usually use natural resource, wage rate or unemployment rate as the proxies of these resource factors (Hill and Munday, 1992; Friedman *et al.* 1992).

Of course, markets and resources are not the only factors that affect FDI inflows. Evidence suggests that many other factors, including policies and economic stabilization in the host country, the law system, the business climate or environment and some other macroeconomic variables also play important roles in the allocation decision of investments (Moore *et al.* 1987; Hines, 1999). And with the development of 'free-trade areas', the differences between those two types of FDI become less distinctive.

On the other hand, tax rates are another key factor that could influence FDI location decisions. Some economists argue that although investment decisions of an enterprise are affected by a series of factors, they are eventually determined by marginal after-tax returns. For example, Jorgenson (1963, 1971) set up the 'basic capital cost theory' in their research to analyze the relationship between tax policies and investment activities. According to this theory, investment decisions are affected by corporate tax in two ways. Firstly, if taxes are

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imposed on the marginal earnings, it will result in the decrease of the marginal income of the investment which may restrain investment activities. On the other hand, if the government allows tax deductions, the costs of capital will decrease which may encourage the activities of investment. Therefore *ceteris paribus*, tax incentives should have positive effects on FDI. According to previous empirical studies on this field, most evidence shows that compared to factors such as labor costs, infrastructure and market size, tax incentives have limited effects on the initial foreign investment decisions (Barlow and Wender, 1955; Aharoni, 1966; Root and Ahmed, 1978; Lim, 1983) but significant impact on the decision of regional choice in a country or area after market entry (Forsyth, 1972; Hines, 1995).

This study mainly investigates the tax effects on FDI location choice whilst controlling for other non-tax factors that may influence investment decisions in China. Table 4 reports the non-tax variables used in this paper. First of all, according to the market-seeking theory, MNEs may be primarily interested in investing in areas with larger market or potential market for development because market demand directly affects the expected revenue of the investment. As stated above, the larger the market size of a particular area is, *ceteris paribus*, the more attractive the area is to investors. This paper uses the total output of a city and the growth rate of output to capture the market demand effect.

**Table 4: The possible non-tax determinants of FDI distribution**

Control variables	data
Infrastructure	1) Annual water supply ( <i>Water</i> ) 2) Annual electricity supply ( <i>Electricity</i> ) 3) Road ( <i>Road</i> )
Market size and potential market size	Output of city <i>i</i> ( <i>Output</i> ) and growth rate of output for city <i>i</i> ( <i>Growth</i> )
Labor costs	Wage rate in region <i>i</i> ( <i>Wage</i> )
Education	Total number of students in University in city <i>i</i>
Labor availability	Unemployment rate and population

Secondly, on the basis of resource-seeking theory, infrastructure should be another crucial factor that has significant effect on FDI inflows, including energy supplies, transportation capacities, expenditures on road and so on. Many previous empirical studies found a positive relationship between the infrastructure conditions and FDI inflows (Hill and Munday, 1992; Mudambi, 1995; Tung and Cho, 2001). In this study, annual water and electricity supply and per capita possession of road are regarded as proxies for infrastructure variables.

Labor resource is another important factor that could influence investment decisions especially for labor-intensive industries. MNEs usually have to consider the quality of the workforce they intend to employ in the host area which includes the availability, costs and education level of the local labor force. Obviously, the relationship between labor costs and FDI inflows tends to be a negative one. And the amount of the workforce in an area should have a positive effect on investment decisions. The empirical studies by Culem (1988) and Friedman *et al.* (1992) showed evidence in support of those arguments. This study uses wage rate, total number of students in universities as proxies for labor costs and education levels of the labor force, respectively. In addition, population and unemployment rate data are collected to test the effect of labor availability in China.

Furthermore, as a special situation in China, there are remarkable regional differences in geographic conditions and infrastructures. Cities in the eastern part of China are located near the sea or rivers which have obvious advantage in transportation compared to western areas which are mostly covered by mountains or grassland. The 'opening up' policy of the Chinese Government is executed from the east to the west, which leads to different degrees of openness and unbalanced economic development around China. Therefore, regional

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differences are taken into consideration in the analysis of FDI location choice and the effects of tax incentives and concessionary tax rates are compared in different parts of China as well.

## 3. RESEARCH HYPOTHESIS AND MODEL SPECIFICATION

### 3.1. Hypotheses development

In order to encourage foreign investment, the Chinese Government has implemented a series of tax and policy benefits for foreign investors including reducing taxes, giving favorable policy treatments, enhancing political stability and improving infrastructure. This section sets out the main hypotheses under a general equilibrium theory.

Tax variable is the most common factor to be tested by previous studies in this field. Many previous studies provide evidence that taxes significantly influence the performance of foreign direct investment (Hartman, 1984; Hines, 1995; Tung and Cho, 2001). China is a particularly representative case to test the tax effects on FDI regional distribution because of the double tax system and special tax incentive policies applied by the Chinese Government.

**H1:** *Cities with concessionary tax benefits and more favorable tax rates are expected to attract more FDI than other cities.*

There exist significant regional differences within China including geographic features, economic development, environment, infrastructure, etc. Therefore, it is necessary to consider the regional factors in the estimation of FDI determinants (Tung and Cho, 2001). Some previous studies have investigated the regional differences of FDI in the UK and US (Wren and Jones, 2009) but few so far have been focused on the Chinese market.

**H2:** *Cities located in the eastern and inner parts of China would have more FDI inflows than those located in the western and inner parts of China.*

Infrastructure is another important variable that is believed to have an effect on FDI location decisions. Many previous studies have found significant correlations between measures of infrastructure and FDI inflows (Head and Ries, 1996; Coughlin *et al.* 1991; Kumar, 2001), although some other studies found no significant relationship (Bronzini, 2004; Shepotylo, 2006). In China, infrastructure development is highly unbalanced between eastern and western areas, and between major cities and smaller cities. Therefore, the strong correlation between infrastructure and region variables implies infrastructure is expected to have a positive effect on FDI inflows.

**H3:** *All else equal, cities with better infrastructure conditions will attract more FDI than cities with less developed infrastructure.*

In the mainstream academic literature, seeking market is one of the main purposes for MNEs to invest overseas. Therefore, market size or the growth rate of market should be a very important determinant for FDI. Many studies have been focused on the market effects on FDI location decisions, such as Milner and Pentecost (1994) and Billington (1999). Usually GDP or the growth rate of GDP is used as the proxy for market size or potential market size in host countries.

**H4:** *Cities with larger market size (output) are expected to attract more FDI than other cities.*

Labor cost (wage rate) is another common variable tested in FDI determinants estimation. The original resource-seeking theory of FDI has indicated that seeking low cost labor is an important incentive for MNEs to invest overseas. Low labor costs are believed to be one of the primary reasons for China's success in attracting such a high volume of FDI inflows (Hill

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and Munday, 1992; Friedman *et al.* 1992; Janicki and Wunnava, 2004; Ali and Guo, 2005). Besides wage rates, labor costs can also be proxied by labor conditions, unemployment rates or labor regulations.

**H5:** *Cities with higher wage rates are expected to have lower levels of FDI inflows.*

### 3.2. Estimation methods

Most research on this field uses time series analysis. The dataset in this study combine time series and cross sections for analysis which provide rich sources of information to examine the determinants of FDI distributions across provinces and over time. The structure of the data indicates that in addition to pooled regressions (OLS), a better analytical methodology for this study is the panel data model. Panel data analysis is a method of studying a particular subject within multiple sites, periodically observed over a defined time frame. Panel analysis has enabled researchers to undertake longitudinal analyses in a wide variety of fields and endows regression analysis with both a spatial and a temporal dimension. The use of panel data also provides a means of controlling for the effects of missing or unobserved variables which OLS regression cannot do. The two specifications most commonly used are the fixed effects (FE) and random effects (RE) models based on the assumptions on the individual-specific effects and how they are treated. Here, Hausman test (Hausman, 1978) is used to choose between fixed and random effect models. For this study, we use fixed effects model for the estimations as a result of the Hausman test. However, as robustness checks, this research also reports the OLS estimation results for comparison.

The fixed effect equations can be extended to include both group effect and time-specific effect:

$$Y_{it} = X'_{it} \beta + \alpha_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where  $Y_{it}$  is the amount of FDI in city  $i$  in year  $t$ ;  $X'_{it}$  is a vector of explanatory variables;  $\varepsilon_{it}$  is the disturbance associated with individual  $i$  at time  $t$ ;  $\beta$  is the vector of parameters to be estimated;  $\alpha_i$  and  $\lambda_t$  are the coefficients on the individual-specific and time-specific dummy variables which allow for heterogeneous intercepts across individuals and time. In this study, we use the classical fixed-effects model in which the coefficients of the explanatory variables are fixed over time, namely, there is only one vector of  $\beta$  parameters in estimation.

The model of this paper is developed from Tung and Cho (2001). Tung and Cho (2001) made some modifications on the previous models to examine the tax incentives and regional investment choice in China. They showed that tax rates and tax incentives are important determinants of regional investment decisions in China, as well as the infrastructure variables. However, there are several caveats existed in their research. Firstly, the sample is not representative enough, which only covers 43 special tax incentives zones and cities. Secondly, Tung and Cho (2001) failed to consider the large regional discrepancies in China's economy and infrastructure, which means that concessionary tax benefits are supposed to have different effects in different parts of the country. Therefore, this research collects more comprehensive data for regression analysis (covering 300 major cities in China) and takes the regional differences factors into consideration. In addition, the analysis not only compares the differences between special incentive zones and other non-special incentive cities but also within special tax incentives zones based on the different concessionary tax rates they are subject to.

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Based on the above discussion, the following regression model is used in this study:

$$FDI_{it} = \alpha_0 + \beta_1(33\% - T_{it}) + \beta_2 West + \sum_k \alpha_k control_{kit} + \varepsilon_{it} \quad (2)$$

where the subscript denotes region/city  $i$  in year  $t$ .  $T_{it}$  is the tax rate for city  $i$  in year  $t$ .  $West$  is set to be 1 for cities that are located in the western area and 0 otherwise. The control variables that may influence FDI include infrastructure, market size, market size growth, labor costs, education and labor availability. As shown in Table 4, infrastructure is proxied by annual water supply, annual electricity supply and per capital possession of road; market size is represented by the output of a city and the growth rate of output; wage rate is a proxy of labor costs and the total number of students in a city is the proxy of labor force education; labor availability is represented by the unemployment rate and population of a city. Note that the tax effects captured in this study are only a small part of tax incentive policies. As shown in Table 2, in addition to tax incentive policies for different regions/cities, different forms of FIEs have varying tax concessions. Further, tax rates and tax incentives are also different across sectors. Information revealed from China's national databases is not sufficient to capture such complexities on tax incentives between sectors and different forms of FIEs. Here, the tax rates used are the weighted average tax rates for cities with tax incentive policies and the normal fixed tax rate of 33% for cities without tax incentives.

However, as discussed in the last paper, an obvious disadvantage of the FE model is that it cannot include variables which are static over time, such as the region dummies. This is because the regional dummy ( $West$ ) is inevitably collinear with the individual dummies (i.e. cities) used in the fixed-effect model. In order to circumvent this problem while examining the effect of specific areas in China on FDI, two alternative methods are used. First and obviously, the collinearity can be removed in a random-effect setting but this can only serve as a robustness check given the results of the Hausman tests in favor of fixed-effect models. Second, the regional dummy is 'interacted' with other variables in the fixed-effect models so as to compare the difference of each FDI determinant across eastern and western areas<sup>8</sup>. Both methods will be used in the empirical results section that follows.

According to the second method discussed above, a set of new variables ( $Tax * West$  and the product of  $West$  and other control variables) is added to the model to depict this interaction between tax incentive (and other) variables and the region dummy:

$$FDI_{it} = \alpha_0 + \beta_1(33\% - T_{it}) + \beta_2 West + \beta_3(33\% - T_{it}) * West + \sum_k \alpha_k control_{kit} + \sum_k \lambda_k control_{kit} * West + \varepsilon_{it} \quad (3)$$

where all variables are defined in the same ways as in Eq (2).  $\beta_3$  is the coefficient of interest as it measures whether or not the effects of tax benefits are different between the western and other areas of China (given the definition of  $West$ , a positive  $\beta_3$  indicates that the FDI sensitivity of tax benefits is larger in the western area than the rest of China). In addition, this study also tries to look at the changes of FDI inflows over time particularly after 1992 (new tax law), though the results are not report in regression analysis.

<sup>8</sup> In linear regressions, the inclusion of a dummy variable shows the difference between two groups of samples on the intercept, whilst the interaction term of a dummy variable and another variable shows the difference of slope coefficients (on the variable) between the two groups.

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## 4. DATA AND DATA DESCRIPTIVES

This section describes the data collection process and sample statistics for this study. The methodology of the regression analysis for this paper is also discussed in this part.

### 4.1. Data and sample selection

This study examines the effects of tax rates and tax incentives on FDI location choice in China whilst controlling for other variables such as output, infrastructure, labor costs and so on. Consequently, the data used in this study includes the amount of FDI utilized, which is the dependent variable of the empirical analyses and various independent variables. They are obtained from 1) Urban Statistical Yearbook of China (National Bureau of Statistics, PRC, 1990-2007 editions); 2) China Economics Information and Statistics Database. The Urban Yearbooks provide two figures of FDI—'the amount of *agreed investment*' and 'the amount of *actually utilized*'. The latter one is used in this study to measure the actual amount of investments in each city. Concessionary tax rates and tax incentives in different regions are collected from the Yearbook of China's Special Economic Zones and Coastal Economic Technology Development Zones.

The sample period of this study is from 1990 to 2008. Data from 300 cities, which covers most major cities in the east, middle and west part of China, are collected for this research. Only major cities in every province are selected to minimize the impact of unusual or extreme effects<sup>9</sup>. The sample consists of seven Special Investment Incentive Zones which include 143 cities, and 157 non-tax incentive cities. Those tax incentive zones and cities offered a concessionary a tax rate for FDI ranging from 15% to 24%.

On the other hand, this study divides all the cities into two categories by geographic locations, namely eastern and western areas<sup>10</sup>. In order to compare the tax incentive effects in different regions, data are collected in a manner that a balance could be kept between eastern and western cities. There are 107 cities located in the western provinces and the rest of cities belong to the eastern areas.

Table 5 shows the proportion of economic activity that represented by the sample cities. According to the 2008 data, the output of sample cities selected in this study accounted for 52% of China's total GDP. The proportion of total FDI inflows represented by the sample cities is 93%, of which 96% is from cities in the eastern areas. It can be seen that the sample cities could well represent the economic activities in China. Because the selection of sample cities is by definition non-random, there could be possible sample selection bias. This problem is to some extent addressed by removing outliers (i.e. the largest cities) from the analysis, or by the inclusion of control variables.

**Table 4: The proportion of economic activity represented by sample cities**

	GDP (RMB Bil)	FDI (USD Bil)	Population (Mil)
Sample cities	15,577	92.4	1,328.0
China	30,067	89	358.6
proportion	52%	93%	27%

<sup>9</sup> Major city means cities at the level of Prefecture-level, County-level or Municipality cities.

<sup>10</sup> This classification is based on the China Economics Information Database.

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## 4.2. Descriptive statistics

Table 6 presents the descriptive statistics for the variables. This study did not eliminate the outlier observations, because that will drop some important cities such as Shanghai and Beijing. Removing missing values has resulted in a sample of 272 cities with 3,297 observations<sup>11</sup>.

*Tax differences* is the differences between the income tax rates of special tax incentives zones and tax rates of non-tax incentive cities (ordinary income tax of 33%).

$$\text{Tax difference} = \Delta \text{taxrate} = 33\% - T_{it} \quad (4)$$

where  $T_{it}$  means tax rate in city  $i$  year  $t$ . For cities located in special incentive zones or with special tax policies, the tax rates range from 14% to 25%; for other cities, the tax rate is 33%. *Output* and *wage rate* are denominated in RMB (the Chinese currency) and the *FDI* in US dollars<sup>12</sup>. The mean value of *tax difference* is 6.9% ranging from 0 to 18%. For cities without tax incentive policies, the tax difference is 0 by definition and for tax incentive zones the tax difference is greater than 0. It can be seen that the FDI of a city varies from 0 to USD7919 million, which is a considerably large range. The same situation is seen in *output* (ranging from RMB471 million to RMB1206, 606 billion) and infrastructure variables<sup>13</sup> as well. Those figures imply that the development of economy and the establishment of infrastructures are seriously unbalanced in China.

Note that there are some ‘abnormal’ observations or potential outliers for some variables. This could either happen due to the lack of standard variable definition or censoring method (e.g. 0% unemployment means no officially registered unemployment), or poor data quality. Most of these observations are found in the early years of the sample period, when the data is highly incomplete and the national statistics system is significantly under-developed. Removing these observations or winsorising these variables thus has a negligible effect on the overall empirical results.

**Table 6: Descriptive statistics**

Variable	Mean	S.D.	Min	Max	Cities
<i>FDI</i> (USD Mil)	186.01	568.55	0.00	7,919.54	272
<i>Tax difference</i>	6.90	6.39	0.00	18.00	272
<i>West</i>	0.21	0.41	0.00	1.00	272
<i>Output</i> (RMB Mil)	26,966.79	65,228.59	471.00	1,206,606.00	272
<i>Growth</i> (%)	18.98	23.56	-100.00	593.26	272
<i>Population</i> ('000)	1,206.39	1,432.51	143.50	15,260.20	272
<i>Unemployment</i> (%)	1.56	1.72	0.00	31.25	272
<i>Wage</i> (RMB '000)	11.35	6.77	0.68	49.44	272
<i>Water</i> (Mil ton)	182.22	330.99	1.62	9,448.50	271
<i>Electricity</i> (Mil kwt-hr)	3,8388	6,987.68	0.00	107,238.00	271
<i>Road</i> (Mil km)	6.47	8.75	0.00	419.10	271
<i>Education</i> ('000)	113.11	151.17	0.72	1,238.66	271

<sup>11</sup> For most cities the infrastructure data is not available until 1991. Therefore, the infrastructure variables have a slightly smaller sample size with 3,072 observations in 371 cities. Including only these 3,072 samples in the empirical analyses does not alter the regression results significantly, but will reduce the sample size in some cases. Results that only include these samples are available from the author upon request.

<sup>12</sup> To check the potential effect of exchange rates on FDI volume, the FDI data has been converted into the local currency (RMB) using the prevailing exchange rates at year end. However this does not have any significant effect on the overall results.

<sup>13</sup> The unit of each variables are displayed in table 5.

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## 5. EMPIRICAL RESULTS

Tables 7 to 9 present the results of the regression analyses. As a robustness check, this paper reports the regression results for the full sample as well as the results for the using observations that exclude Beijing, Shanghai, Guangzhou and Shenzhen. The reason for removing those four cities is that they were open to foreign investors relatively earlier and have superior political or economic conditions than other cities, which means they have been playing a very important role in attracting FDI inflows but also are the natural candidates for outliers. Those four cities have established economies of scale and good business environments for foreign investors and as a result, they tend to be more attractive to foreign investors even without tax incentives. Therefore, in order to capture tax incentives for FDI it is necessary to re-test the model by removing those four cities (Sun *et al.* 2002).

Table 7 shows the pooled regression results. Specifications 1 to 3 report the results using the full sample of cities and Specifications 4 to 6 report the results for the sample excluding Beijing, Shanghai, Guangzhou and Shenzhen. For all specifications tax incentive variables and region variables are statistically significant at 1%. This is consistent with the prediction by H1 that cities with larger concessionary tax benefits attract more foreign investment.

FDI is significantly related to some non-tax factors, as well. Market size (*output*) is significantly and positively associated with FDI inflows which indicate market size is another important factor that determines FDI location decisions (H4). However, the growth rate of output does not have any significant effect. For all specifications in table 8, wage rate (*wage*) has a negative and statistically significant effect on FDI inflows which is consistent with hypothesis H5. For the whole sample models, both water and electricity supplies are positively related to FDI. This implies that infrastructures on natural resources (e.g. water) and energy (e.g. electricity) are more important considerations than utilities (e.g. road) when FIEs make investment decisions. Interestingly, education is negatively related to FDI inflows, which may owe to the fact that most of the foreign investment in China are within labor-intensive industries that have lower needs for highly educated employees. This could also be a result of the strongly imbalanced distribution of educated workforce in China and city-specific needs for more educated labors, which means the effect of education has to be considered in the context of individual cities using panel data models.

There are some interesting findings when excluding the four largest FDI recipient cities (Beijing, Shanghai, Guangzhou and Shenzhen), although our main findings on tax, region, infrastructure, market size and wage variables still hold (Specifications 4 to 6). The negative coefficient estimate on *population* may reflect the high concentration of investments in labor-intensive industries in the four cities that are removed from the analysis, especially Guangzhou and Shenzhen. Labor force availability may have become a less important consideration when investing in cities other than those four. Electricity supply becomes negatively related to FDI probably because the majority of electricity generated will be transmitted to larger cities where foreign investment is concentrating. Therefore, electricity may not be a precise measure of the energy supply in that specific city especially when the city is not a major city.

Table 8 represents the results using panel data models. Again we first report the results for the full sample (Spec 1 to 4) and then for a sample without the four major FDI recipient cities (Spec 5 to 8). The coefficient estimates of tax incentives and output are positive and significant, which confirms the results from the pooled regressions. The growth rate of output (*growth*) variables do not have any explanatory power in panel data analysis using the full sample of 300 cities, however, the coefficient estimates for *growth* when excluding the four major cities are highly significant and positively related to FDI at 95% confidence level which indicates that the growth potential of a city is a key consideration when foreign investors decide to invest in a 'second tier' city other than the primary cities of FDI.



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The coefficient estimates for labor market variables (*Population* and *Unemploy*) are different from the OLS results. Here unemployment numbers are significantly positively related to FDI inflows, implying that unemployment is a better proxy for labor availability. Wage rate (*wage*) remains significantly and negatively related to FDI especially when making investment decisions in cities other than the four major ones. As the largest recipients of FDI, the four super cities may be the main driving force for the results found so far. This means that compared to other cities, high wage rates may not be a main barrier for investments in these four cities owing to their good investment environment and high degree of economic development. Electricity supply is still an important consideration of FDI especially when including the four large cities in the analysis. Importantly, the panel model estimation results show that *Education* is significantly and positively correlated with the amount of FDI when taking city-specific effects into account in the empirical analysis.

Examining the regional differences in FDI decision making is another key objective of this study. An obvious approach is to include a region dummy variable (*West*) in the regression models. As revealed in Table 7 in OLS regressions, cities located in the western areas receive significantly lower amounts of FDI. Here the average difference between western and other cities is around USD 40 million in terms of actual-utilized FDI. Because of the collinearity between the region dummy and individual effects, the only way to use the region dummy in a panel data setting is a RE model. Specifications 3 and 7 of Table 8 show similar findings with the OLS models.

Given the dramatic change in tax policies in 1992, it would be interesting to investigate the location choice of FDI before and after 1992. A natural strategy would be to include a dummy variable for samples pre- and post-1992 in the regressions. By adding a year dummy (1 if year > 1992 and 0 otherwise) in specification 1 of Table 8, the coefficient estimate for the dummy is positive and significant at 1% level, meaning FDI has increased significantly after the introduction of major tax incentive policies in 1992<sup>14</sup>. However the result should be interpreted with caution. First, the pre-1992 sample size is only 137 out of 3,297, giving rise to a big coefficient estimate with a large standard error. Second, the time effect should have already been captured by the inclusion of year-specific effect in each of the FE panel data specifications. Another way to investigate regional differences in China's FDI inflows is to 'interact' the location of a city with the key determinants of FDI identified in the previous analyses (Eq 5-3). For OLS regressions, the results for Eq (5-3) are reported in Specifications 3 and 6 of Table 8 and for panel data regressions, the results are reported in Specifications 4 and 7 of Table 8.

Both OLS estimates and panel data regression results in table 7 and 8 show strong evidence on the different effect of tax incentives on FDI in different parts of China. It is shown that the coefficient estimates for *tax\*West* are negative and highly significant. Since *West* are set to be 1 for cities that are located in the west of China and 0 otherwise, the negative coefficient means that tax incentives have larger effects on FDI inflows in the eastern than the western part of China as we predicted. That could be the results of several reasons, for example, the complex geography situations in the western cities, undeveloped economy or the relatively scarce labor resources but ample natural resources, all of which could hamper foreign investors' decisions to invest in these areas. For other interaction terms, coefficient estimates on *output\*West* and *electricity\*West* are statistically significant and negative, as well. However, the coefficient estimate of *electricity\*West* becomes positive for the estimation using samples without the four major FDI recipient cities (Spec. 8) which indicates that electricity supply is a very critical factor for FDI location choice and it may have greater effects in western area than eastern area for normal cities.

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<sup>14</sup> The coefficient estimate is 52.69 with a standard error of 22.64.

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**Table 7: Pooled regressions: Determinants of FDI**

Variables	Spec (1)	Spec (2)	Spec (3)	Spec (4)	Spec (5)	Spec (6)
<i>Tax diff.</i>	8.187*** (0.858)	7.947*** (0.912)	10.406*** (0.964)	6.366*** (0.696)	6.639*** (0.743)	8.136*** (0.779)
<i>West</i>	-50.136*** (12.098)	-44.943*** (12.878)		-36.384*** (9.399)	-37.013*** (10.116)	
<i>Output</i>	0.007*** (0.000)	0.006*** (0.000)	0.005*** (0.000)	0.009*** (0.000)	0.011*** (0.000)	0.011*** (0.000)
<i>Growth</i>	0.258 (0.204)	0.236 (0.214)	0.179 (0.221)	0.237 (0.159)	0.298* (0.169)	0.283* (0.172)
<i>Population</i>	0.017*** (0.005)	0.030*** (0.010)	0.018* (0.011)	-0.050*** (0.005)	0.006 (0.009)	0.009 (0.009)
<i>Unemploy</i>	2.478 (2.845)	-0.131 (3.248)	1.644 (3.478)	-1.119 (2.213)	-1.166 (2.554)	0.073 (2.709)
<i>Wage</i>	-3.251*** (0.875)	-1.723* (0.981)	-2.001* (1.022)	-6.037*** (0.752)	-119*** (0.820)	-167*** (0.842)
<i>Water</i>		0.151*** (0.023)	0.146*** (0.022)		0.042** (0.019)	0.058*** (0.019)
<i>Electricity</i>		0.013*** (0.002)	0.016*** (0.002)		-0.012*** (0.002)	-0.017*** (0.002)
<i>Road</i>		1.011* (0.607)	0.947 (0.600)		0.580 (0.480)	0.670 (0.470)
<i>Education</i>		-0.405*** (0.095)	-0.231** (0.103)		-0.663*** (0.083)	-0.633*** (0.090)
<i>Tax * West</i>			-9.807*** (2.910)			-8.263*** (2.269)
<i>Output * West</i>			-0.003*** (0.001)			-0.008*** (0.001)
<i>Growth * West</i>			0.639 (0.689)			0.198 (0.536)
<i>Population * West</i>			0.020 (0.031)			-0.016 (0.025)
<i>Unemploy * West</i>			4.074 (8.084)			1.409 (6.282)
<i>Wage * West</i>			2.441 (2.387)			2.106 (1.860)
<i>Water * West</i>			-0.252* (0.150)			-0.164 (0.117)
<i>Electricity * West</i>			-0.018*** (0.006)			0.016*** (0.005)
<i>Road * West</i>			6.278 (4.937)			3.199 (3.838)
<i>Education * West</i>			0.298 (0.292)			0.809*** (0.231)
<i>Constant</i>	-43.886*** (14.554)	-74.880*** (16.082)	-9104*** (1868)	28.088** (12.111)	12.035 (13.290)	-501 (12.976)
<i>Sample size</i>	3297	3072	3072	3240	3020	3020
<i>Adjusted R<sup>2</sup></i>	0.767	0.777	0.785	0.660	0.668	0.686

**Notes:** This table shows the OLS regression results for Equations (2) and (3). Specifications 1 to 3 report the results using the full sample and Specification 4 to 6 report the results excluding Beijing, Shanghai, Guangzhou and Shenzhen. Specification 3 and 6 report further analyses on the interaction effects between regions and FDI determinant variables. *Tax diff.* = 33% -  $T_{it}$  and *West* = 1 for cities located in the western provinces and 0 otherwise. \*, \*\*, \*\*\* stand for 10%, 5% and 1% significant levels, respectively.

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**Table 8: Panel data regressions: Determinants of FDI**

	Spec (1)	Spec (2)	Spec (3)	Spec (4)	Spec (5)	Spec (6)	Spec (7)	Spec (8)
Variables	FE	FE	RE	FE	FE	FE	RE	FE
<i>Tax diff.</i>	14.828*** (4.168)	8.645*** (2.986)	9.587*** (1.445)	11.409*** (3.331)	8.784*** (2.685)	7.332*** (2.261)	8.722*** (1.974)	9.390*** (2.523)
<i>West</i>			-37.458* (21.154)				-27.722** (13.480)	
<i>Output</i>	0.005*** (0.000)	0.003*** (0.000)	0.004*** (0.000)	0.003*** (0.000)	0.008*** (0.001)	0.008*** (0.000)	0.009*** (0.002)	0.009*** (0.000)
<i>Growth</i>	0.238** (0.103)	0.160 (0.162)	0.113 (0.170)	0.152 (0.169)	0.208** (0.102)	0.264** (0.122)	0.244** (0.115)	0.263** (0.127)
<i>Population</i>	-0.023 (0.029)	-0.100*** (0.014)	-0.023** (0.011)	-0.112*** (0.014)	-0.089*** (0.028)	-0.089*** (0.011)	-0.054** (0.025)	-0.093*** (0.011)
<i>Unemploy</i>	5.000*** (1.832)	6.913** (2.751)	390* (2.821)	7.303** (3.038)	2.281* (1.252)	3.430* (2.069)	2.903* (1.603)	3.707 (2.281)
<i>Wage</i>	1.599 (1.206)	-1.100 (0.840)	-2.171*** (0.840)	-0.149 (0.900)	-3.180** (1.514)	-3.231*** (0.671)	-3.911** (1.536)	-2.474*** (0.719)
<i>Water</i>		-0.006 (0.023)	0.078*** (0.022)	-0.007 (0.023)		-0.002 (0.017)	0.016 (0.019)	0.006 (0.017)
<i>Electricity</i>		0.023*** (0.003)	0.023*** (0.003)	0.025*** (0.003)		-0.008*** (0.002)	-0.008 (0.009)	-0.012*** (0.003)
<i>Road</i>		0.262 (0.489)	0.443 (0.507)	0.183 (0.488)		0.304 (0.370)	0.354 (0.520)	0.293 (0.368)
<i>Education</i>		0.724*** (0.098)	0.380*** (0.094)	0.875*** (0.106)		0.068 (0.083)	-0.055 (0.266)	0.185** (0.092)
<i>Tax * West</i>				-12.900* (7.355)				-10.880** (520)
<i>Output * West</i>				0.003* (0.001)				-0.003*** (0.001)
<i>Growth * West</i>				0.167 (0.554)				0.056 (0.415)
<i>Population * West</i>				0.048 (0.065)				0.028 (0.049)
<i>Unemploy * West</i>				-7.696 (7.028)				-4.100 (265)
<i>Wage * West</i>				-6.239** (3.010)				-3.914* (2.268)
<i>Water * West</i>				-0.068 (0.219)				-0.081 (0.164)
<i>Electricity * West</i>				-0.022*** (0.009)				0.015** (0.007)
<i>Road * West</i>				3.519 (6.565)				3.409 (4.915)
<i>Education * West</i>				-0.810** (0.336)				-0.120 (0.256)
<i>Constant</i>	-57.937 (46.579)	-3.683 (24.373)	-65.050*** (18.300)	-3.263 (26.756)	36.555 (32.277)	48.898*** (18.215)	22.797 (2489)	41.222** (19.963)
<i>Sample size</i>	3297	3072	3072	3072	3240	3020	3020	3020
<i>No. Cities</i>	272	271	271	271	268	267	267	267
$\chi^2$	100.19***	236.10***	—	2496***	40.25***	843***	—	111.16***
$R^2$	0.745	0.745	0.767	0.738	0.639	0.638	0.658	0.648

**Notes:** Table 8 shows the panel data regression results for Equations (2) and (3). Specifications 1 to 4 report the results using the full sample and Specification 5 to 8 report the results excluding Beijing, Shanghai, Guangzhou and Shenzhen. In addition, specification (3) and (4) represent random effects regression result as the robust check while the rest of other specifications report fixed effects results according to Hausman test.  $\chi^2$  reports the Hausman test statistic by comparing the coefficient estimates for FE and RE models, respectively. *Tax diff.* = 33% -  $T_{it}$  and *West* = 1 for cities located in the western provinces and 0 otherwise. \*, \*\*, \*\*\* stand for 10%, 5% and 1% significant levels, respectively.

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As a robustness check, the persistence of the dependent variable (FDI) is considered. This involves using a dynamic panel data framework of the Blundell and Bond (1998) model, which includes lags of dependent and independent variables in the estimation. All right-hand side variables are the same as in static models but are lagged in their first orders to reduce possible endogeneity. Table 9 shows the regression results for robust one-step GMM-system estimations (Blundell and Bond, 1998). Note that in all specifications there is strong evidence of significantly negative first-order serial correlation in differenced residuals (AR(1)) and no evidence of second-order serial correlation in the first-differenced residuals (AR(2)), which is a key requirement for the GMM estimators to be valid. For all specifications, the Sargan test of over-identifying restrictions are rejected but this could be associated with the findings by Blundell et al (2000) that the Sargan tends to over-reject when the GMM method is used. It can be seen that most of the findings from static panel data models still hold except for infrastructure variables. This is possibly a result of the low correlation between beginning-of-year infrastructure and year-end FDI volumes. As it is a common practice to use fixed-effects in dynamic panel data models, it is impossible to include the region dummy variable (*West*) in the regressions. However, when tax incentive variable is interacted with the region dummy, it still shows that tax is a less important consideration in FDI location choice in the western areas.

To summarize, tax incentives, region and output factors are very crucial variables that affect the FDI allocation decisions in China using both OLS estimates and panel data analyses. As expected, tax difference and output variables are positively related to FDI while region dummy variables are negatively related to FDI inflows. Moreover, wage rate is another important factor that may influence FDI location decisions in the way that high wage rates will stop foreign investors from making investment in a city. For infrastructure factors, the supply of electricity is found to have the largest impact on FDI. It is evident that removing four possible 'outlier' cities does not change the main results to a large extent.

Table 9: Dynamic panel data regressions: Determinants of FDI

Variables	Spec (1)	Spec (2)	Spec (3)	Spec (4)	Spec (5)	Spec (6)
<i>Tax diff.</i> <sub><i>t</i>-1</sub>	0.505*** (0.071)	0.592*** (0.083)	0.509*** (0.081)	0.491*** (0.132)	0.552*** (0.134)	0.560*** (0.131)
<i>Output</i> <sub><i>t</i>-1</sub>	1237** (6.660)	9.667** (4.402)	12.012*** (4.507)	6.164* (3.698)	8.693*** (3.307)	8.568** (3.417)
<i>Growth</i> <sub><i>t</i>-1</sub>	0.003*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.006*** (0.001)	0.007*** (0.002)	0.007*** (0.002)
<i>Population</i> <sub><i>t</i>-1</sub>	0.194 (0.215)	0.208 (0.246)	0.226 (0.278)	0.321 (0.197)	0.342 (0.216)	0.334 (0.227)
<i>Unemploy</i> <sub><i>t</i>-1</sub>	0.065** (0.029)	0.069 (0.049)	0.045 (0.050)	-0.012 (0.026)	0.007 (0.028)	0.017 (0.030)
<i>Wage</i> <sub><i>t</i>-1</sub>	846* (3.178)	6.290* (3.230)	128* (3.084)	2.829* (1.597)	4.095** (2.088)	2.906 (1.951)
<i>Water</i> <sub><i>t</i>-1</sub>		0.065 (0.089)	0.116 (0.124)		0.001 (0.011)	0.008 (0.012)
<i>Electricity</i> <sub><i>t</i>-1</sub>		-0.009 (0.012)	-0.020 (0.020)		-0.011 (0.008)	-0.017* (0.009)
<i>Road</i> <sub><i>t</i>-1</sub>		0.206 (0.277)	1.053 (1.183)		-0.033 (0.122)	-0.008 (0.119)
<i>Education</i> <sub><i>t</i>-1</sub>		-0.407 (0.252)	0.572 (0.598)		-0.442* (0.255)	-0.474* (0.271)
<i>Tax * West</i> <sub><i>t</i>-1</sub>			-12.603*** (4.451)			-9.929** (3.949)
<i>Output * West</i> <sub><i>t</i>-1</sub>			-0.004** (0.002)			-0.005*** (0.002)
<i>Growth * West</i> <sub><i>t</i>-1</sub>			0.250 (0.288)			-0.154 (0.215)
<i>Population * West</i> <sub><i>t</i>-1</sub>			0.020 (0.050)			-0.015 (0.026)
<i>Unemploy * West</i> <sub><i>t</i>-1</sub>			3.959 (4.013)			3.715 (3.324)
<i>Wage * West</i> <sub><i>t</i>-1</sub>			1.747 (2.814)			0.182 (1.878)
<i>Water * West</i> <sub><i>t</i>-1</sub>			-0.146 (0.149)			-0.002 (0.069)
<i>Electricity * West</i> <sub><i>t</i>-1</sub>			0.019 (0.019)			0.017* (0.009)
<i>Road * West</i> <sub><i>t</i>-1</sub>			12.603*** (4.779)			6.188* (3.566)
<i>Education * West</i> <sub><i>t</i>-1</sub>			-0.481 (0.609)			0.569** (0.253)
AR(1) ( <i>p</i> -value)	0.004	0.002	0.002	0.002	0.004	0.005
AR(2) ( <i>p</i> -value)	0.296	0.280	0.277	0.255	0.287	0.292
Sargan ( <i>p</i> -value)	0.000	0.000	0.000	0.000	0.000	0.000
number of obs.	260	260	260	256	256	256
number of groups	2939	2939	2939	2886	2886	2886

**Notes:** Table 9 shows the regression results for robust one-step GMM-system estimation (Blundell and Bond, 1998) in a dynamic panel data setting. Specifications 1 to 3 report the results using the full sample and Specification 4 to 6 report the results excluding Beijing, Shanghai, Guangzhou and Shenzhen. Sargan is a  $\chi^2$  test of overidentifying restrictions. Second and Service are dummy variables set to be 1 if a sector belongs to second and third/tertiary industries, respectively, and 0 otherwise. A constant term is included in each specification. Asymptotic robust stand errors are reported in parenthesis. \*, \*\*, \*\*\*stand for 10%, 5% and 1% significant levels respectively.

## 6. CONCLUSIONS

This study investigates the impact of tax incentive policies on the regional distribution of FDI in China whilst controlling for other variables including infrastructure, market size, labor costs

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and regional differences. Using a sample consisting of 300 cities from all 34 provinces in China for the periods of 1990-2008, this study finds that that tax incentives and region factors are very crucial variables that affect the FDI allocation decisions in China. As expected, tax difference variables are positively related to FDI while cities located in the eastern and middle parts of China have attracted more FDI inflows than those located in the western part of China. In addition, wage rate, market size and infrastructure development especially electricity supply are found to play important roles in the FDI location choice in China. These findings are consistent with both market-oriented and resource-oriented theories of FDI location choice. Finally, the empirical evidence suggests that tax incentives and market size have greater effects on FDI inflows in the eastern than the western part of China.

Generally speaking, there is inconclusive empirical evidence for FDI location choice from the previous literature as samples, data periods, variables and methodologies may differ in each study. The main findings in this study are generally consistent with most of the previous studies for the Chinese market (Tung and Cho, 2001; Lan and Yin, 2009) and confirms the critical roles of tax, market size and infrastructure when foreign investors make investment decisions. More importantly, this study finds new evidence on the impact of regional factors in the FDI location choice in China. However, this study does not consider the new tax policy implemented in 2008, which has imposed a unified tax rate for both foreign invested and domestic enterprises. Future studies on the impact of these new policies on FDI inflows and location decisions in China are warranted when relevant data become available.

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# THE SUSTAINABILITY OF JOINT VENTURES BETWEEN STATE OWNED ENTERPRISES AND GLOBAL FIRMS FOR CAR MAKING BUSINESS IN CHINA

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**Abstract:** Since 2009 China has kept the first place globally at the automobile production and the sales volume. The practical growth engine for China's automobile industry is Joint Venture (JV) makers between State Owned Enterprises (SOEs) and global makers which having concentrated on passenger car making business. The JVs' role at the passenger car business of China has been expanded continuously since early 1990s. Chinese government has strictly prevented a foreign maker from holding above 50% of whole equity of a JV at vehicle making business. It means that the strategic alliances like non-equity alliances, equity alliances or JV have been feasible options for global makers to take for entering China's vehicle making business. Therefore this study took a deep interest in how much sustainable the JV contract in China, and tried to access the issues through industry based view and institution based view. At industry based view, this study analyzed which strategy is more desirable among three types of strategies; non-equity alliances, equity alliances and acquisitions. To do so this study applied the framework suggested by Dyer *et al.* (2004) for deciding which strategy is relatively more suitable than others according to five factors; types of synergies, nature of resources, extent of redundant resources, degree of market uncertainty, and level of competition. At institution based view, Chinese local governments' plans, governance structures of SOEs and JVs, policy regulations for automobile industry were examined. As a result acquisition turned out to be more suitable than equity alliance or nonequity alliance for vehicle makers in China under current development condition. But the sustainability of a type of equity alliances, JV will be maintained so long in future due to the institutional factors of China.

**Keywords:** China's Automobile Industry, China's Vehicle Making Business, Joint Venture of China Strategy Selection Framework, Shanghai Auto(SAIC), First Auto(FAW)

## 1. INTRODUCTION

China has maintained the first place globally at the automobile output and sales volume since 2009. The annual vehicle output and sales volume of China in 2012 reached 19.27 million, 19.30 million respectively, and annual growth rates was 4.6%, 4.3% each (China Association of Automobile Manufacturers (CAAM), 2013). The CAGR(Compound Annual Growth Rate) for automobile production and sales volume of China from 2002 to 2012 were 19.3%, 19.2% each, which are about two times higher than the GDP increase rate of China for the same period. The global number one position of China at the vehicle making business will go on for a long time in future, and its growth engine role for world automobile industry will expand too. However, the increase rate for vehicle production and sales volume dropped by 0.8%, 2.5% respectively in 2011, and the growth rate in 2012 was just 4.6%, 4.3% each. Many forecasts pointed out that the production and sales volume will surpass 25 million at around 2015, but explosive growing pattern was stopped abruptly in recent. The biggest

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reason for it is closely related with the industry policy change for vehicle sales promotion; tax reduction or government subsidies. So it can be a meaningful research topic for the automobile industry of China at the viewpoint of institution factor because formal institutions like regulations, rules or policies substantially affected the growing speed of vehicle making business.

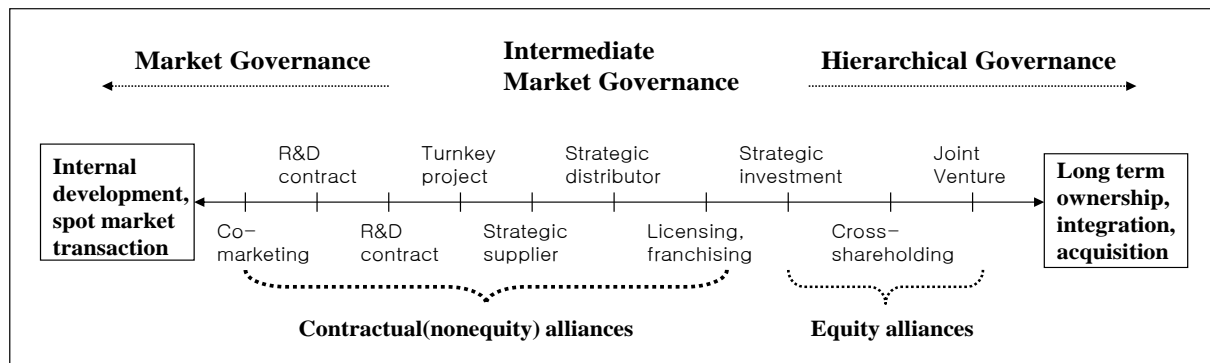
Generally the study for China's automobile industry can be accessed by three sides; the firm resource based view, the industry based view, institution based view. When taking the industry based view or the resource based view it needs to focus on 'top six vehicle makers' of China, large-sized SOEs (State Owned Enterprises) and other private makers with only concentrating on passenger car business. The former group includes SAIC (Shanghai Automotive Industry Corporation), FAW (First Automobile Works), DFM (Dongfeng Motor Corporation), Changan, BAW (Beijing Automobile Works), and GAIG (Guangzhou Automobile Industry Group). The latter group includes Chery, BYD, JAC (Jianghuai Automobile Corporation), GWM (Great Wall Motors), and Geely. However when accessing the automobile industry of China, Chinese government should be considered as another key factor because it creates most of the formal institutions (Choi, 2012b; Gan, 2003; Peng, 2000). In fact Chinese local governments have been deeply involved in major SOEs' operation, so the approach for local governments' behavior is a core part of institution based view for China's automobile industry.

In addition it needs to take a more interest in the difference of managerial features between entire vehicle making business and passenger car business when accessing China's automobile industry. Because the passenger car making business has played a critical role for automobile industry development since early 1980s as well as the major firms, key success factors and rivalry condition of it are different from the entire vehicle making business including commercial vehicles (Gan, 2003). Especially most of major firms of passenger car business of China were Joint Ventures (JVs) created by collaboration contracts between SOEs and global makers (Min, 2005). JV contract is a type of strategic alliances, more exactly to say one of equity alliances and most of JV contracts in China's passenger car business are effective until 2025~ 2030, the JVs' equity structures for SOEs and foreign partners are mostly 50:50.

Such intended outcomes by industrial policies or local governments intervention, JV contract has been a dominant collaborative type between SOEs and global makers. And now it needs to examine whether the JV contract is most preferable strategy or not for China's automobile industry because there exist many kinds of equity alliances except JV, and nonequity alliances or acquisitions can be more suitable strategy for present condition. To do so this study applied the strategy selection framework by Dyer *et al.* (2004). In addition performance analysis for overall automobile industry as well as major vehicle makers of China was done, and then main issues for sustainability of JV contracts were reviewed on institution based view.

## 2. THEORETICAL BACKGROUND

Strategic alliance exists whenever two or more independent firms cooperate in R&D, mass production, sales of products or services (Barney *et al.* 2010). Through the strategic alliance all partners can share each firm's resource and capability or integrate business activities on value chain. Strategic alliance can be classified into three types; nonequity alliances, equity alliance, and joint venture. Nonequity alliance happens the cooperation among firms is organized through contracts without cross-equity holdings or an independent firm being made. The equity alliance means the cooperative contract that supplemented by equity investment by one partner in other partner or reciprocated investment for each other.



**Figure 1: Governance structure comparison for nonequity alliance, equity alliance, acquisition**

Source: Peng (2006, p.255), Barney *et al.* (2010, p.332).

Generally co-marketing, R&D contract, strategic distributor, licensing or franchising contract are classified into the nonequity alliance but the equity alliances cover the strategic investment, cross shareholding or Joint Venture (Figure 1). Among equity alliances, joint venture (JV) is a legally independent firm that made by cooperating partners, and all partners share any profit or loss of the JV. In addition the substitutes of strategic alliance include the internal development through the spot market transactions and the mergers & acquisitions (M&A), more exactly to say, acquisitions (Figure 1). However through the internal development a firm is able to start a new business when it tries to develop all the resources and capabilities for catching market opportunities or neutralizing market threats by itself. Such a 'going alone' strategy would be a feasible option when there is almost no limit to easily acquire human resources, new technology, production facility or distribution network at any time form the market. In addition the market transaction cost should not be more than alliance negotiation or alliance management cost. If not so, the alliance can make more value than 'going alone' strategy.

Acquisitions occur when a firm purchases a controlling share of a target firm or a majority of its asset in order to begin a new business or enter the existing business swiftly. So acquisitions are mainly used to do diversification strategy because a firm is able to gain effectively the economy of scale or the economy of scope through the vertical integration<sup>1</sup> on value chain. Actually acquisitions can be considered as a next step or another type of equity alliance at the point of the level of cooperation among partners because a partner is able to make the hierarchical governance structure whenever it wants a stronger relationship for the alliance contract. However alliance might be preferred to acquisitions when there are legal constraints on M&A or acquisitions restrict a firm's managerial flexibility under conditions of high uncertainty (Barney *et al.* 2010). In addition when a firm's independence is more valuable than the integration or the unwanted organizational baggage of target firm is substantial, alliances might be preferred to acquisitions.

Dyer *et al.* (2004) suggested a framework that supports a firm to approach systematically before deciding whether to acquire or to ally with potential partners. Firstly they picked up three key factors which a firm should consider at decision making process for the collaboration options; nonequity alliance, equity alliance, acquisitions. Three factors include the resources and synergies they want, the marketplace they compete, and their competencies at collaboration (Dyer *et al.* 2004). Among three factors, the resources and synergies were categorized by three sub-factors; type of synergies, nature of resources, extent of redundant resources (Table 1). In addition the marketplace they compete is accessed by two sub-factors; degree of market uncertainty and the level of competition. In

<sup>1</sup> The number of stages in a product's or service's value chain that a particular firm engages in defines that firm's level of vertical integration. The greater this number, the more vertically integrated a firm is. It can be divided into two types; forward-integration and backward-integration (Barney, 2002).

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result the framework was composed by such five factors but the competency of collaboration was not added in.

**Table 1: Strategy selection framework for nonequity alliances, equity alliances and acquisitions**

<Five Factors>	<Strategy Selection>
<b>1. Types of Synergies</b>	
Modular	Nonequity alliances
Sequential	Equity alliances
Reciprocal	Acquisitions
<b>2. Natural of Resources (Relative Value of soft to hard resource)</b>	
Low	Nonequity alliances
Low, Medium	Acquisitions
High	Equity alliances
<b>3. Extent of Redundant Resources</b>	
Low	Nonequity alliances
Medium	Equity alliances
High	Acquisitions
<b>4. Degree of Market Uncertainty</b>	
Low	Nonequity alliances
Low, Medium	Acquisitions
High	Equity alliances
<b>5. Level of Competition (Degree of competition for resources)</b>	
Low	Nonequity alliances
Medium	Equity alliances
High	Acquisitions

Source: Dyer *et al.* (2004, p.114)

At the Table 1, the modular synergies among synergy type happen when business partners manage resource independently and share only when the collaboration generates a better performance. The sequential synergies are created when a partner finishes its task successfully and passed on the result for other partner to proceed the following task. However the collaborating firms can make reciprocal synergies if they integrate resources, customize them and complete tasks together through an interactive knowledge sharing system. The nature of resources means how much valuable of the intangible asset or soft resources like employees of the potential partner when comparing with the value of tangible asset like production plants.

The extent of redundant resources is related with the decision for a firm to be able to use the surplus resources for creating the economy of scale or to get rid of those resources for cost reduction. The degree of market uncertainty<sup>2</sup> is concerned with how much the payoffs are unclear when a firm tries to collaborate with the potential partners. Specifically when a firm should select the collaboration type or pursuits the 'going alone' strategy, it is expected that the collaboration's result is very uncertain or moderately unclear, a firm needs to apply a nonequity or equity alliance rather than acquisition because the alliance can limit the cost and time being necessary for maintaining the collaboration. Finally the level of competition suggests a firm should consider the acquisition more actively than alliance when the rivals or potential entrants try to involve in the game for some critical resources. In this case the

<sup>2</sup> Generally the uncertainty exists when it is very hard to expect the future payoffs nor probability distribution of future values but the risk exists when a firm can estimate the probability distribution of future payoffs that is the wider the distribution, the higher the risk (Barney, 2002).

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acquisition might be the best option to preempt the intensive competition for resources. Basically it can be said that this framework takes the industry based view.

However the institution based view accounts for the performance difference by using external factors resulted from the state, government or a society like law, norms, ethics or cultures. Industry cluster<sup>3</sup> approach or Porter's diamond model<sup>4</sup> are representative tools for it. Douglas North defined institution as humanly devised constraints that structure human interaction, and Richard Scott used institution as a term for regulatory, normative, and cognitive structures and activities that provide stability and meaning to social behavior (Peng, 2006). Regarding the former studies for institution based view, Peng (2001) traced the reason why firms' business strategies differ in different countries and at different times, and clarified the constraints of institution for business strategy selection through Asian firms' cases. In addition the dynamic relation among three factors, institutions, organizations and strategic choice was examined.

Peng (2000) also took a comparative approach for relationship between local governments and MNEs, and analyzed the performance of their JV makers at Chinese vehicle making business throughout 1980s. Peng (2000) regarded the central government of China as a principal who wants to control overall plan of automobile industry development while assuming that local governments and SEOs as agents which should do something beneficial for a principal. Peng (2000) compared the performances of three JV makers; Beijing Jeep, Shanghai Volkswagen, Guangzhou Peugeot, in result Shanghai Volkswagen was considered as the most successful case in local government's bargaining power for central government, management style of JV, problem solving capability of global partner, vehicle parts localization rate. Gan (2003) put emphasis on the externality costs of automobile industry like exhaust emissions or traffic congestion, and suggested more active policies should be made to reduce vehicle emissions and to promote environment friendly vehicle development. In addition it was argued that Chinese policy makers need to seriously reconsider existing policies for encouraging private car ownership that mostly preferred to vehicle makers in order for sustainable growth. Recently Choi (2012a) analyzed the formal institution of China, three representative policies<sup>5</sup> for automobile industry. Choi (2012a) classified each purpose of whole contents of three policies by using four factors of Porter's Diamond model; industry structure, demand condition, related industry, factor condition. As a result the main objects of three policies have been changed from the industry structure centric approach to vehicle buyer centric approach.

### 3. GOVERNANCE STRUCTURE OF JV AUTOMOBILE MAKERS

#### 3.1. Governance structure condition for SAIC, DFM, FAW and GAIG

In order to access the sustainability of JVs it needs to review the relationship between SOEs and local government of China because Chinese central government has strictly restricted global makers holding over 50% share of a JV's whole share through 'Automobile Manufacturing Industry Policy' published in 1994. To begin with the governance structure for

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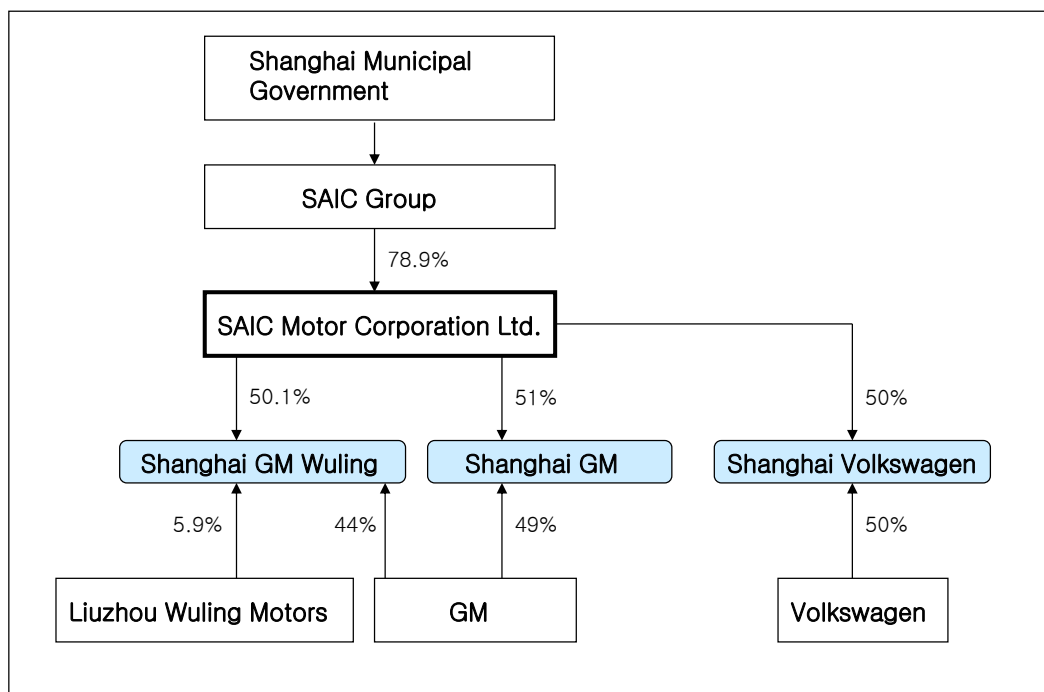
<sup>3</sup> Industry cluster is the critical masses in one place of linked industries and institutions from suppliers to universities to government agencies that enjoy unusual competitive success in a particular field (Porter, 1998). It is a geographic concentration of interconnected companies and institutions to find out the functional commonalities or complementary in a particular field with low cost. In addition clusters encompass an array of linked industries and other entities important to competition (Porter, 1998).

<sup>4</sup> Diamond model approach is generally used to analyze the competitiveness of a region or a cluster. Four factors of Diamond model are the context for firm strategy and rivalry, production factor conditions, related and supporting industries, and local demand conditions (Porter, 1990).

<sup>5</sup> Choi (2012a) suggested 'Automobile Industry Policy (*qiche chanye gongye zhengce*)' in 1994, 'Automobile Industry Development Policy (*qiche chanye fazhan zhengce*)' in 2004 and 'Automobile Industry Restructuring & Promotion Plan (*qiche chanye tiaozheng he zhenxing guihua*)' in 2009 as three key policies for automobile industry of China.

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leading JVs of passenger car making business was examined, and then the involvement of local governments which closely related with major SOEs was reviewed. In particular among big six SOEs of vehicle manufacturing business, the governance structures for top one, two, three makers; SAIC, DFM, FAW were analyzed and GAIG were added to the analysis as a representative maker of Guangdong province, the most developed region in Southern China.

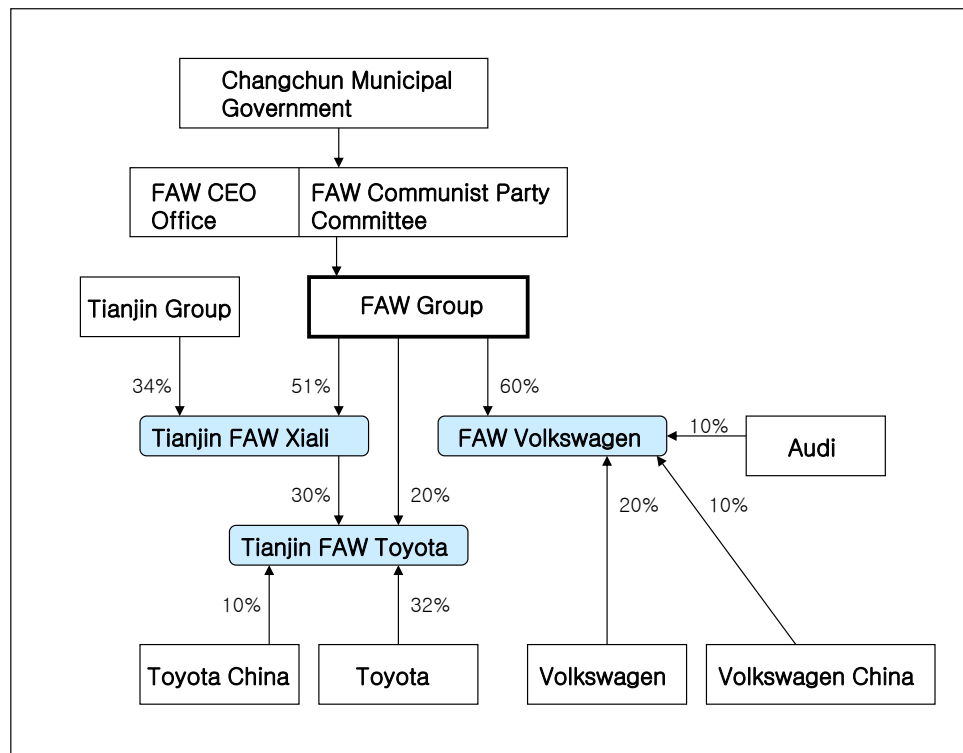


**Figure 2: Governance structure of SAIC group**

Source: CAAM (2012, p.82, pp.422-423).

Firstly the SAIC Group (*shanghai qiche gongye jituan zonggongsi*), in short SAIC is a dominant shareholder of SAIC Motor Corporation Ltd. (*shanghai qiche jituan gufen youxian gongsi*), in short SAIC Motor which is also a holding company for thirty six subsidiaries including vehicle makers, components makers and financial support, R&D firms<sup>6</sup> (Figure 2). As of late 2012 SAIC holds 78.9% of total share of SAIC Motor, and SAIC Motor not only takes 50.1% share of SGM Wuling but also holds 50% share of SGM, 51% share of SVW. GM holds 49% share of SGM and 44% share of SGM Wuling. Volkswagen takes 50% share of SVW. However Shanghai municipal government has deeply involved in growing process of SAIC since 1978 when the first negotiation between SAIC and Volkswagen for making SVW started. The negotiation took seven years to reach the final agreement and during that time Shanghai municipal government had played a critical role that seems like an agent between Volkswagen and central government of China. For last thirty years the SAIC and its local government have successfully created an intimate & tacit cooperation structure.

<sup>6</sup> By 2012 among thirty six subsidiaries of SAIC, the number of vehicle makers including two EV makers was sixteen, and the number of vehicle parts makers including three EV components makers were eleven.



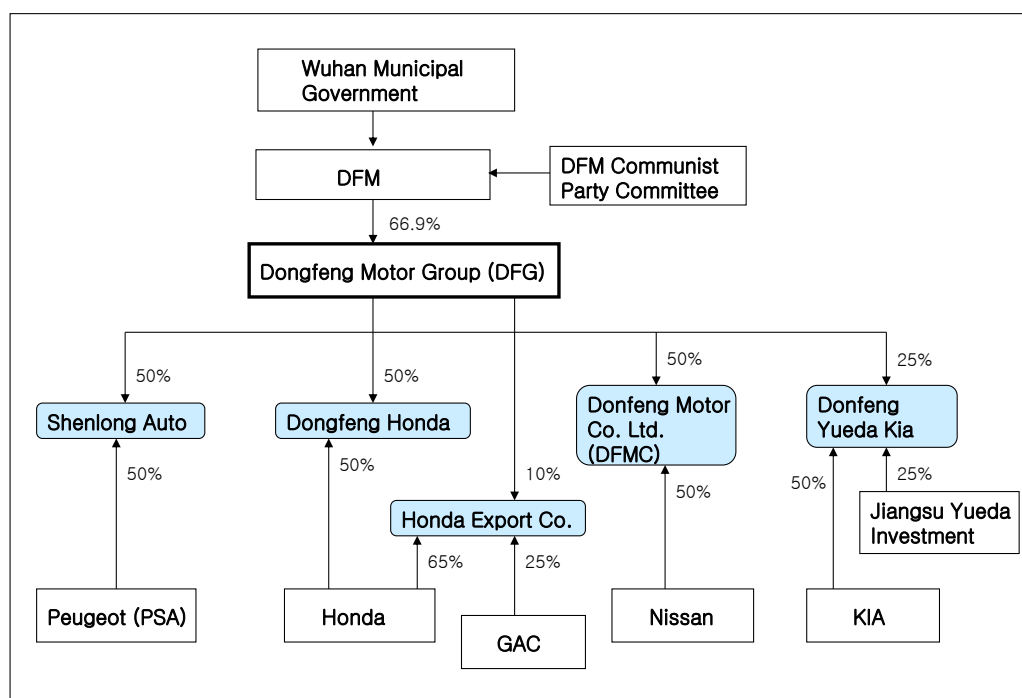
**Figure 3: Governance structure of FAW group**

Source: CAAM (2012, p.80, p.420)

Secondly, FAW Group Co., in short FAW is also a holding company that has eleven wholly owned subsidiaries and eleven partially owned subsidiaries, four branch firms until 2012. FAW takes 60% of total share of FAW-VW and 20% share of Tianjin FAW Toyota (Figure 3). In addition FAW holds 51% share of Tianjin FAW Xiali. However Toyota and Toyota China respectively holds 32% and 10% share of Tianjin FAW Toyota. Volkswagen and Volkswagen China separately holds 20% and 10% share of FAW-VW. It can be said that the operation of FAW has been mainly under control of Changchun municipal government and Jilin provincial government since the foundation of FAW in 1953. The inner Communist Party Committee of FAW has developed common goals together with local government as well as impacted on main managerial issues of FAW.

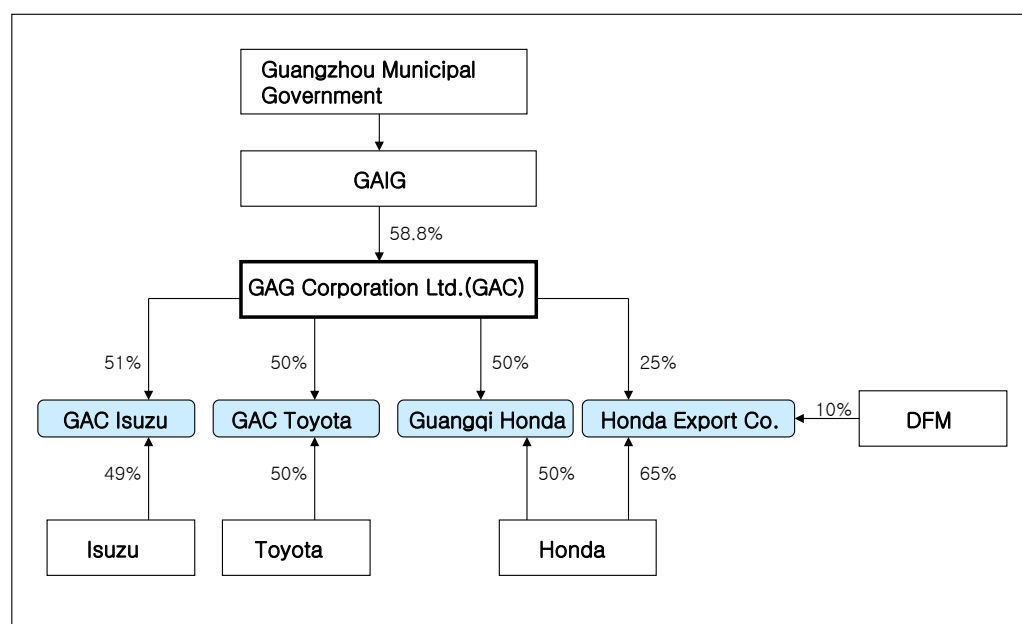
Thirdly, DFM had made Dongfeng Motor Group (DFG) in 2001 through joint investment together with China Huarong Asset Management Co., and China Development Bank etc. In 2004 DFG had been transformed a holding company, and after that it has developed to control sixteen major subsidiaries including vehicle producing JVs, parts suppliers and financing firms. As of late 2012, DFM holds 66.9% of total share of DFG which takes 50% share of Dongfeng Peugeot (Shenlong Auto), Dongfeng Honda, Dongfeng Motor Corporation Ltd. (DFMC) respectively (Figure 4). In addition DFG has 25% share of Dongfeng Yueda Kia and 10% share of Honda Export Corporation. Peugeot, Honda, Nissan holds 50% share of Shenlong Auto, Dongfeng Honda and DFMC each, and KIA takes 50% share of Dongfeng Yueda KIA.





**Figure 4: Governance structure of DFM**

Source: CAAM (2012, p.81, p.421).



**Figure 5: Governance structure of GAIG**

Source: CAAM (2012, p.84, p.425).

DFM has been under control of Wuhan municipal government and Hubei provincial government since the foundation in 1969 as the original name, 'the Second Automotive Works.' Like FAW, inner Community Party organizations of DFM have deeply involved in decision making process for important managerial issues like JV contracts, acquisitions or equity alliances.<sup>7</sup> Finally GAIG is also a holding company of GAG Corporation Ltd., in short GAC. Until 2012 GAIG takes 58.8% of total share of GAC which has eighteen subsidiaries including GAC Toyota, Guangqi Honda. GAC holds 51% share of GAC Isuzu, 50% share of

<sup>7</sup> As of late 2012, the number of Community Party organizations of DFM was one hundred fifty two, and their branch offices reached 1,694 with having 44,180 Community Party members.

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GAC Toyota, 50% share of Guangqi Honda (Figure 5). Honda takes 50% share of Guangqi Honda, and 65% share of Honda Export Corporation. In addition GAC and DFM respectively holds 25% share and 10% share of Honda Export Corporation. Like other SOEs, local government has made a significant influence on GAIG's development since the foundation of GAIG in 2000. Especially after the end of JV partnership between GAIG and Peugeot in 1997, Guangzhou municipal government, as the owner of GAIG's assets, has actively supported GAIG get a performance at the JVs partnership.

### 3.2. Main issues for sustainability of equity alliance; JV contract

The governance structure analysis for JV automobile makers of China suggests four main issues about the sustainability of them. Firstly at the point of SOEs their global partnerships for equity alliance mostly concentrates on two or three partners. Since 2000 the JV partnerships between SOEs and global makers have been stronger through JV contract extension or collaborative range increment. By using the partnership SOEs intended to develop their own new models as well as go abroad along with their new models rather than with existing models of global partners. However global makers put more emphasis on increasing their domestic market share in China through manufacturing capabilities mainly with existing models. Although there has been such a recognition gap between SOEs and global makers, basically they have shared a common goal; to survive continuously & to reinforce their market position in China. Currently core partners of SAIC's are Volkswagen and GM, FAW partners are Volkswagen and Toyota. In addition GAIG's global partners include Toyota, Honda and Isuzu but DFM keeps JV partnership not only with Honda, Toyota but also with Peugeot, KIA. Actually most of their JV contracts had been renewed in late 1990s, so the contracts will go on until 2025~2030.

Secondly global makers also have concentrated on a couple of Chinese partners but Chinese government intentionally limited the number of JV vehicle makers which global makers can establish, actually just one JV every one brand as well as total two JVs for each global maker. Both the article 29 of 'Automobile Industry Policy (*qiche chanye gongye zhengce*)' in 1994 and the article 48 of 'Automobile Industry Development Policy (*qiche chanye fazhan zhengce*)' in 2004 covered such restrictive conditions (Choi, 2012a). However there was no limit for the number of JV that Chinese partners can establish at vehicle production business. In other words foreign partner did not have any way to build more than two JVs at vehicle manufacturing business of China. The select and concentration strategy of global makers for JV partnership resulted from involuntary activity by institution factor of China but SOEs' select and concentration strategy came from their own decision in which local government involved.

Thirdly it is necessary to look into carefully the role of Chinese local government for the sustainable growth of JV makers. At governance structure for SAIC, FAW, DFM, GAIG, each local government has deeply involved in its SOE's management. Local governments want their SOEs and JVs to be leading vehicle makers having nationwide brand power in China because its forward & backward influence on other industries is so big as to be a critical factor in regional economy. Currently key interests of local government for vehicle making business can be summarized as three points; creating the competitive advantage for its leading SOE, improving the independent model launch and vehicle parts production capability, facilitating the hybrid electric vehicle (HEV) or electric vehicle (EV) commercialization<sup>8</sup> (CAAM, 2009; CAAM, 2010). So Chinese specific institutional factor, that

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<sup>8</sup> The commercialization performance for HEV and EV in China was much poor than what was expected when the promotion policies made in 2008. The sales volume for alternative energy vehicles only was 8,159 units in 2011. Among them the EV sales volume was 5,579 and the HEV sales volume was 2,580. In 2012 the sales volume for alternative energy vehicles was 12,791 units of which annual growth rate was 56.8%. However it can be said that it is too early to estimate the effectiveness of commercialization project or promotion policies of China (Montlake, 2013).

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is local government's role cannot be underestimated and the competition among local governments has made up another important part of overall rivalry structure for China's automobile industry (Choi, 2012b).

For example Jilin province government together with Changchun city published 'Jilin Province Automobile Industry Leap over Plan (*jilinsheng qiche chanye yuesheng jihua*)' in 2009 to upgrade the competitive advantage of its leading maker, FAW (CAAM, 2010). Also Guangdong province government and Guangzhou city announced 'Guangdong Province Automobile Industry Adjustment and Development Plan (*guangdongsheng qiche chanye tiaozheng he zhenxing guihua*)' in 2009 for supporting its leading maker, GAIG. Through the plan Guangdong government suggested specific goals for the number of vehicles made in Guangdong to be two million, to surpass the domestic market share 15%, and to export over 10% of total production (CAAM, 2010). Shanghai municipal government aggressively drives the local sourcing plans for vehicle components through twenty seven R&D centers in Shanghai (CAAM, 2010). It also supports the R&D capability of SAIC through its core R&D complex, called the 'Shanghai International Automobile City (*Shanghai guoji qichecheng*).'

Finally the 50:50 equity structures of JV makers cause controversy for who is a real owner of JV maker in future. Furthermore there have been many arguments for the effectiveness of industrial policies to limit on equity investment by foreign makers or the number of JV maker by them. Because the main objects of such policies, that is launching independent model or going abroad with those new models by Chinese local makers' own capabilities were partially achieved but the overall performances were not so good as expected (Barboas *et al.* 2010). As a result the 'exchange domestic market with technology (*yi shichang huan jishu*)' planning by Chinese government was not realized well in vehicle making business. However the dominant equity holding position of Chinese partner or 50:50 equity structures for JV makers will go on for a long time, at least until 2025~2030 when current JV contracts expire. Above all local governments still worry about the loss of control for SOEs and JV makers due to the governance structure change by global partners.<sup>9</sup> In fact global makers have operated JV makers as their ways based on technical superiority or management knowhow even though Chinese partners were dominant equity holders. Therefore it would be very hard to expect any relax or abolishment of policy regulations on governance structure of JV maker in China for the foreseeable future.

## 4. APPLICATION OF STRATEGY SELECTION FRAMEWORK FOR CHINA'S CAR MAKING BUSINESS

### 4.1. Types of synergies

At the growth history of China's automobile manufacturing business, global vehicle makers began to enter China after early 1980s. A few global makers began to establish JVs through equity alliance contract with Chinese SOEs because Chinese government had not allowed for foreign makers to make wholly owned subsidiaries (WOS) nor to hold controlling share with over 50% in the equity alliances for car making business. SAIC and Volkswagen made the Shanghai-VW by investing 25%, 50% each of whole share in 1985 and GAIG and PSA set up the Guangzhou-Peugeot by taking 78%, 22% share respectively at the same year (Peng, 2000). However the nonequity alliances were much more than equity alliances between SOEs and global makers throughout 1980s in China. The main objectives of the nonequity alliances were the collaborative R&D, vehicle parts supplying contract or technology licensing for passenger car production. Therefore such alliances were more concerned with modular synergy or sequential synergy rather than reciprocal one because

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<sup>9</sup> Chinese government considers that it has still diverse & effective ways to control the demand for vehicle like government subsidy, preferential treatment tax or environment protection tax, furthermore it is able to engage in automobile market whenever government role is needed (Tao, 2009).

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most of global makers partially involved in the passenger car making business by using their technical superiority.

Since early 1990s many global makers had entered China through equity investment for new JVs. Main business model of those JVs were to produce and to sell passenger cars which mostly the existing models of foreign partners. The expected synergies from the JVs were regular, continuous as well as beneficial for both partners. Chinese SOEs could accumulate the passenger car development and production knowledge, in contrast global firms were able to elevate their market shares as their own plans. Therefore it can be argued that reciprocal synergies were created between SOEs and global makers. Furthermore the alliance relations of them have been upgraded since early 2000s. The key objectives of JVs founded from early 1980s to late 1990s were to improve the manufacturing capability and local parts sourcing rate, but most of JVs after 2000s have been more interested in creating the multilateral cooperative relations than before. Such a movement was closely connected with the recognition change of global makers that China would become the biggest automobile market in the world. Therefore global makers had to reinforce the existing partnership as well as to search for something new collaboration model above alliances. Recently JVs began to not only launch new models by themselves through their R&D centers but also produce directly the core parts like engine or transmission in China.

In 1997 GM set up R&D center in Shanghai, called 'Pan Asia Technical Automotive Center (PATAC)' together with SAIC of which equity structure was 50:50. Volkswagen, Toyota and Honda made new production bases for engine and transmission through JVs. Also in 2003 Honda made a JV with two SOEs; DFM and GAIG, called the 'Honda Automobile China Company Limited' that intended to export all the vehicles produced in it. Honda had taken the controlling share, 65% of whole equity but DFM and GAIG got 10%, 25% share respectively. As a result Chinese government agreed that Honda became a dominant shareholder in car making business on condition that the JV would keep the 100% export requirement. Renault-Nissan made a JV with DFM in 2003, called 'Dongfeng Motor Company Limited' of which equity structure was 50:50 between two partners, and the JV set up a R&D center which exclusively for launching new passenger cars.

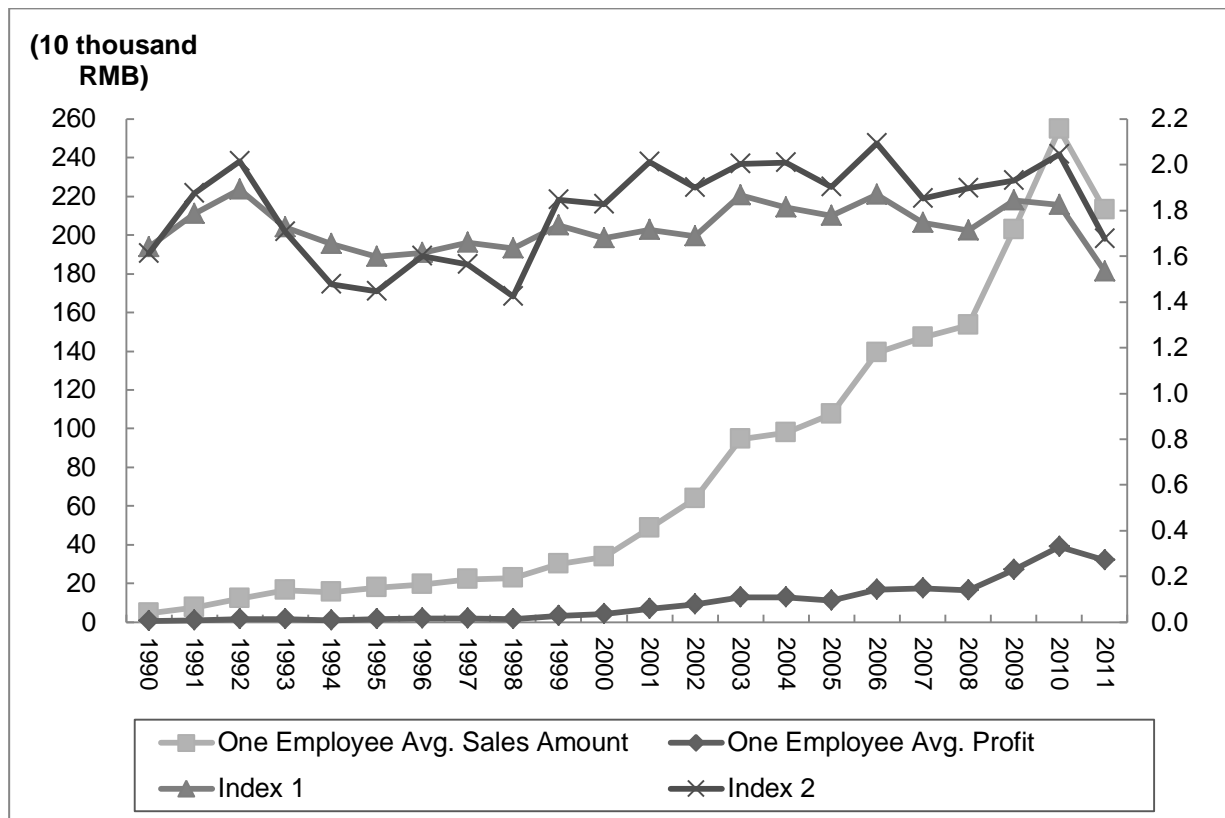
It can be said that such JV partnership strengthening movements between global makers and SOEs means that the expected synergies created by JVs have developed from sequential synergy to reciprocal one. Although the contract periods of JV partnerships, the equity alliances usually were 25~30 years, at the point of synergy type overall development condition of China's car making business already stepped in the stage that acquisitions are preferred to alliances. The fact that GM has taken an aggressive position to acquire local vehicle makers through its JV, Shanghai GM, explains well the necessities for acquisitions. Since early 2000s Shanghai GM had established the subsidiary vehicle makers by acquiring local firms; 'Shanghai GM Beisheng Automotive Limited' in 2004, 'Shanghai GM Dongyue Automotive Limited' in 2003 and 'Shanghai GM Wuling Automobile Company' in 2002.

### 4.2. Nature of resources

In order to estimate the relative value of soft resources to hard resources in China's vehicle production business, it needs to check the labor productivity for vehicle manufacturing business in China because it reflects well the value of soft resources. At (Figure 6), the labor productivity of car making business during 1990s was very low. The average sales amount of one employee 46 thousand RMB in 1990, went up 178 thousand RMB in 1995 and reached 336 thousand RMB in 2000. But the average profit of one employee did not go over 50 thousand RMB until early 2000s. That means that the relative value of human resources to production facilities in car making business was so low as to nonequity alliance would more desirable than equity alliance or acquisition. In fact lots of collaborations between SOEs and global makers had been concentrated on nonequity alliances like components supplying

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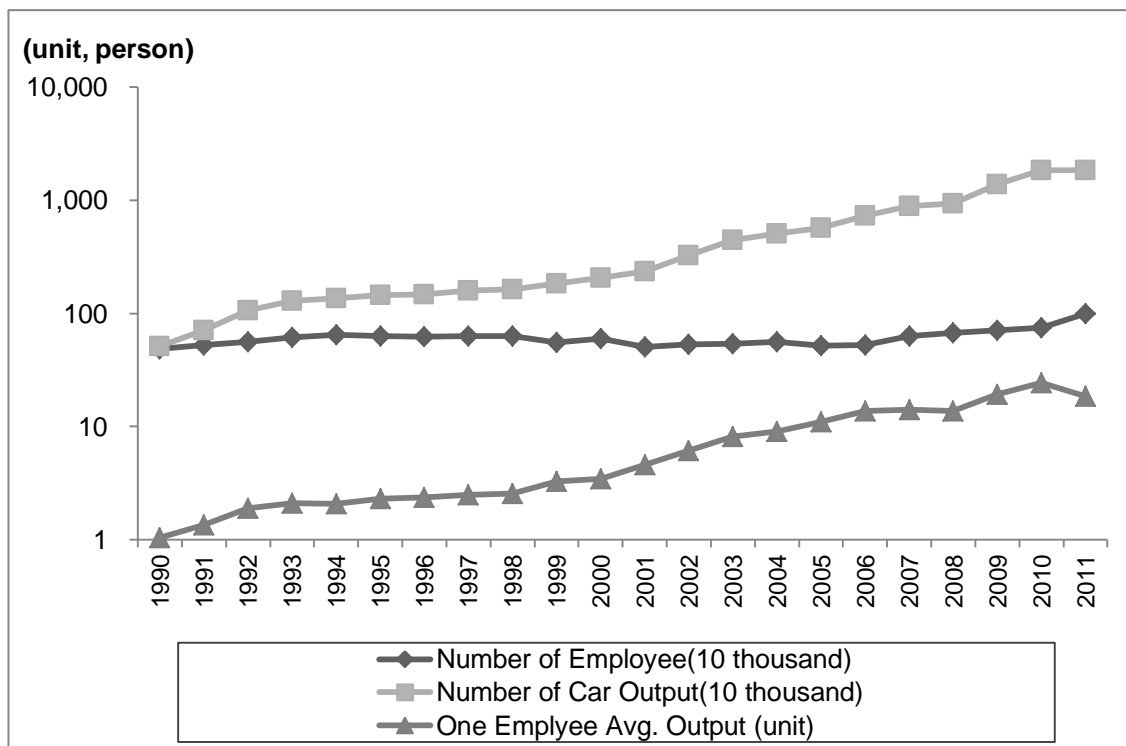
contract, co-development for new model or manufacturing technology licensing throughout 1990s.



**Figure 6: Labor productivity trend for China's vehicle making business**

Source: CAAM (2006, p.518, p.528, p.533) and CAAM (2012, p.492, p.500, p.505).

However for recent ten years, from 2001 to 2010 the labor productivity for car making business had gone up rapidly due to the explosive 'My Car' boom in China. Accordingly most of global makers increased aggressively the direct investment scale for China, and SOEs also tried to expand their production capacity as much as they can through their JVs. Most of JVs emerged as a growth engine of China's automobile industry while being major players of passenger car business as well as core linkages between SOEs and global makers. The average sales of one employee in car making business surpassed one million RMB in 2005, went over two million RMB in 2009 and reached 2.5 million RMB in 2010. The CAGR of average sales of one employee from 2001 to 2010 was 20%, and the CAGR of average profit for the same period reached 21.6%. At (Figure 6) the index 1 was came from the value of average sales of one employee for car making business dividing by average sales of one employee for whole automobile industry in China. As the same pattern, Index 2 was resulted from dividing average profit of one employee for car making business by average profit for whole automobile industry. Both Index 1 and Index 2 suggest that labor productivity of car production business had been relatively higher by 1.8~2 times than the labor productivity of whole automobile industry.



**Figure 7: One employee avg. output trend for vehicle making business of China**

**Source:** CAAM (2000, p.324), CAAM (2006, p.504, p.518), CAAM (2012, p.479, p.492).

**Note:** All the values on Y axis are conversion values by Log calculation.

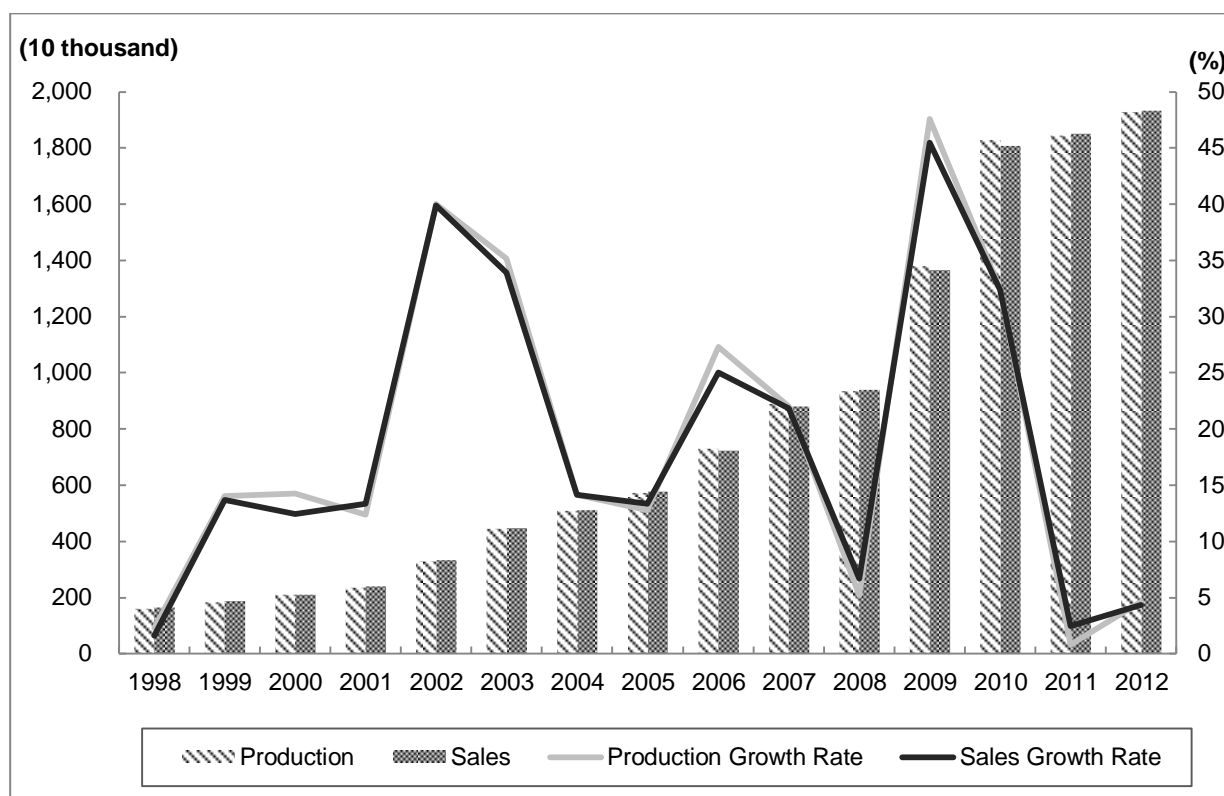
Labor productivity increase for car making business can be shown more clearly through Log calculation (Figure 7). Total number of employees for car making business had kept a stable condition at around 550~650 thousand for last 20 years except 2010 and 2011 (CAAM, 2012). On the contrary the number of vehicle output had grown continuously, as a result the average vehicle output of one employee went up too. The average output of one employee for car making business was just 1.0 unit in 1990 but reached 11.0 units, went up to 24.4 units in 2010. However such a growing movement abruptly stopped in 2011 due to the annual growth rate of automobile sales volume went down to 2.5% in 2011 from 45.5% in 2009, 32.4% in 2010 (Figure 8). Further the growth rate of sales volume had still stayed on a low level in 2012, only 4.3%, so many analysts began to point out that a high growth period already had been over in China's automobile industry. At (Figure 6), the fact that average sales amount of one employee fell in 2011 would be connected with the beginning of a low growth period. Consequently the relative value of labor in China's vehicle manufacturing business had gone up steadily at least before 2010 but came down in recent a couple of years even though it needs more time to see if such a decreasing trend is temporary or not. Based on the nature of resources of the framework, it is time that car makers in China should review seriously the equity alliance strategies mainly with JV contracts to turnover for acquisitions.

### 4.3. Extent of redundant resources

According to the strategy selection framework, if a firm estimates there exist a large amount of redundant assets or resources in overall industry, acquisitions are better than alliances. That gives a chance for a firm to be able to eliminate redundant resources easily on its own decision. For recent three years from 2010 to 2012 the growth rates of automobile production & sales volume showed a big downturn although total production & sales volume somewhat increased. Now such a low growth tendency requires vehicle makers as well as Chinese government change the existing management inertia being apt for a fast growing time. The necessity of restructuring for excess production capabilities more and more increases as

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time goes on but it became more difficult for Chinese local governments to defend local vehicle makers operated in their administration regions.



**Figure 8: Automobile production & sales volume trend of China**

**Source:** CAAM (2011, pp.467-478), CAAM (2010, pp.513-514), CAAM (2009, pp.455-456), China Automobile Marketing Association (2010, p.3), China Automobile Marketing Association (2009, p.37, p.207), China Association of Automobile Manufacturers ([www.caam.org.cn](http://www.caam.org.cn)).

However, the number of vehicle makers in China was one hundred fifteen until 2011 but the number only reduced by three when compared with the number in 2000 (Table 2). That means there had been almost no kicking out cases at China's car making business since 2000. The average revenue and profit per a maker went up to 18.4 billion RMB and 2,758.6 million RMB respectively in 2011 from 1,707.2 million RMB and 21 million RMB in 2000. However in recent the growing speeds of them became blunted, in contrast the market control powers of major makers have been reinforced continuously. In 2012 the sum of market share for top five makers; SAIC, DFM, FAW, Changan, BAW reached 71.7% that increased by 5.5 % point compared with the sum of market share in 2008 (Table 3). In addition those top five makers have maintained their positions without going out of the top five raking circle since 2003 which means their controlling structure for automobile making business of China is so strong as not to allow other players enter the structure for a long time.<sup>10</sup>

<sup>10</sup> In fact the GAIG, the ranking 6th maker in 2012, can be included as another member of the controlling structure because it has kept its rank successively since 2004. As a result it can be argued that Chinese automobile manufacturing business has been dominated by those 'Big Six SOEs' for last 10 years.

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**Table 2: Average revenue & average profit trend of vehicle makers & parts suppliers in China (10 thousand RMB, %)**

Year	Parts Production(except engine)			Automobile Production			Revenue Ratio of Parts Suppliers to Vehicle Makers	Profit Ratio of Parts Suppliers to Vehicle Makers
	Number of Suppliers	Avg. Revenue	Avg. Profit	Number of Makers	Avg. Revenue	Avg. Profit		
2000	1,480	3,998	575	118	170,720	21,008	2.3	2.7
2001	1,558	5,323	717	116	211,871	29,302	2.5	2.4
2002	1,540	8,189	1,136	117	291,179	41,436	2.8	2.7
2003	1,567	10,136	1,459	115	447,096	60,887	2.3	2.4
2004	1,670	11,740	1,377	117	469,274	60,547	2.5	2.3
2005	1,849	14,243	1,382	117	477,171	49,641	3.0	2.8
2006	1,971	20,914	2,154	117	627,282	75,359	3.3	2.9
2007	1,828	26,815	3,167	117	790,915	93,496	3.4	3.4
2008	1,851	27,842	2,504	117	885,120	95,179	3.1	2.6
2009	2,514	22,829	2,907	115	1,259,704	168,043	1.8	1.7
2010	2,519	30,611	3,607	115	1,658,435	254,348	1.8	1.4
2011	2,456	32,826	4,086	115	1,841,830	275,861	1.8	1.5

Source: CAAM (2012, p.468, p.500, p.505).

**Table 3: Market share trend of major makers (Passenger car & commercial vehicle) in China (10 thousand, %)**

Rank	2012			2011			2010		
	Firm	Sales volume	Market share	Firm	Sales volume	Market share	Firm	Sales volume	Market share
1	SAIC	446.1	23.1	SAIC	396.6	21.4	SAIC	356.4	19.7
2	DFM	307.9	15.9	DFM	305.9	16.5	DFM	261.5	14.5
3	FAW	264.6	13.7	FAW	260.1	14.1	FAW	255.8	14.2
4	Changan	195.6	10.1	Changan	200.9	10.9	Changan	238.6	13.2
5	BAW	169.1	8.8	BAW	152.6	8.2	BAW	149.0	8.2
<b>Top Five Sum</b>		<b>1,383.3</b>	<b>71.7</b>		<b>1,316.1</b>	<b>71.1</b>		<b>1,261.3</b>	<b>69.8</b>
6	GAIG	71.2	3.7	GAIG	74.0	4.0	GAIG	72.4	4.0
7	Huachen	63.8	3.3	Chery	64.2	3.5	Chery	68.2	3.8
8	GWM	62.5	3.2	Huachen	56.7	3.1	BYD	52.0	2.9
9	Chery	56.3	2.9	JAC	49.5	2.7	JAC	45.5	2.5
10	Geely	49.1	2.5	GWM	48.7	2.6	Huachen	44.7	2.5
<b>Top Ten Sum</b>		<b>1,686.3</b>	<b>87.3</b>		<b>1,609.1</b>	<b>87.0</b>		<b>1,544.1</b>	<b>85.5</b>
Rank	2009			2008					
	Firm	Sales volume	Market share	Firm	Sales volume	Market share			
1	SAIC	270.6	19.8	SAIC	172.1	18.3			
2	FAW	194.5	14.3	FAW	153.3	16.3			
3	DFM	189.8	13.9	DFM	132.1	14.1			
4	Changan	187.0	13.7	Changan	86.1	9.2			
5	BAW	124.3	9.1	BAW	77.2	8.2			
<b>Top Five Sum</b>		<b>966.1</b>	<b>70.8</b>		<b>620.7</b>	<b>66.2</b>			
6	GAIG	63.7	4.7	GAIG	52.6	5.6			
7	Chery	50.0	3.7	Chery	35.6	3.8			
8	BYD	44.8	3.3	Huachen	28.5	3.0			
9	Geely	32.9	2.4	Hafei	22.4	2.4			
10	JAC	31.9	2.3	Geely	22.2	2.4			
<b>Top Ten Sum</b>		<b>1,189.4</b>	<b>87.2</b>		<b>782.0</b>	<b>83.4</b>			

Source: CAAM (2009, pp.457-458), CAAM (2010, pp.515-516), CAAM (2011, pp.469-470), China Automobile Marketing Association (2010, p.19), CAAM (2012, pp.480-481), China Association of Automobile Manufacturers (www.caam.org.cn).



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The sum of market share for top ten makers went up to 87.3% from 83.4% for the same period. As a result other one hundred five vehicle makers except top ten makers only took 12.7% of total sales volume in 2012, furthermore their market shares have gradually decreased as time goes on. Almost of minor makers could not reach the 100 thousand line of annual sales volume, so their existences will be laid on the marginal condition if a low growing pattern continues in China. On the contrary such a situation will create many opportunities for major makers to acquire small & medium sized makers rather than to make alliances. Chinese government already has taken a proactive stance to restructure the automobile industry because it is deeply concerned about the fact that there are so many vehicle makers and vehicle components suppliers as for its domestic market size (Barboas *et al.* 2010). The number of components suppliers except engine makers was 2,456 in 2011 but the average revenue of them only corresponded to 1.8% of the average revenue of vehicle makers (Table 2). The average profit ratio of local parts suppliers to the average profit of vehicle makers was only 1.5% in 2011.<sup>11</sup> Overall it can be said that the extent of redundant resources goes up at the automobile industry of China, therefore acquisitions are more preferred rather than alliances.

### 4.4. Degree of market uncertainty

In order to access the degree of automobile market uncertainty it needs to look into Return on Asset (ROA) or Return on Investment (ROI) at first. Returning rate for asset of automobile industry is closely concerned with market condition fluctuation. The ROA for China's automobile industry had moderately fluctuated so that it was 16.7% in 1994, 6.3% in 1999, 9.8% in 2005 but soared by 18.6% in 2011 (Table 4).

**Table 4: Return on asset (ROA) trend for automobile industry & car making business of China**

Year	Total Asset of Automobile Industry (A)	Asset of Vehicle Making Business (B)	Total Profit of Automobile Industry (C)	Profit of Vehicle Making Business (D)	ROA (C/A) (%)	ROA (D/B) (%)
1994	814.0	385.7	135.7	65.9	16.7	17.1
1999	5,086.7	2,660.0	318.5	180.8	6.3	6.8
2003	8,037.1	4,570.7	1,032.8	700.2	12.9	15.3
2004	9,270.6	5,260.5	1,063.6	708.4	11.5	13.5
2005	10,026.0	5,219.8	981.9	580.8	9.8	11.1
2006	13,482.1	6,086.8	1,482.3	881.7	11.0	14.5
2007	14,176.6	6,952.4	1,916.9	1,093.9	13.5	15.7
2008	15,107.5	7,549.0	1,821.6	1,113.6	12.1	14.8
2009	18,452.3	10,289.4	3,033.9	1,932.5	16.4	18.8
2010	22,591.8	12,979.6	4,205.5	2,925.0	18.6	22.5
2011	24,690.5	13,809.0	4,600.2	3,172.4	18.6	23.0

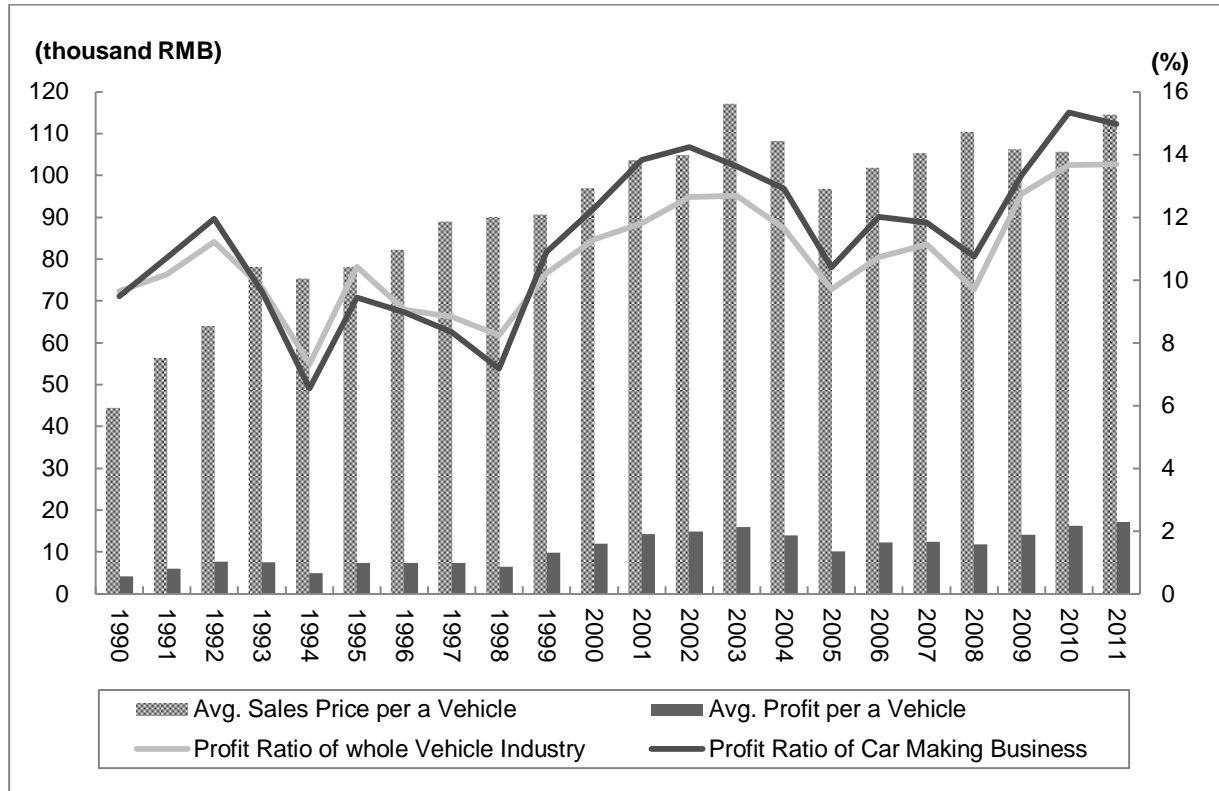
**Source:** CAAM (1995, p.111), CAAM (2000, p.344), CAAM (2004, p.423), CAAM(2005, p.496), CAAM (2006, p.522), CAAM (2007, p.487), CAAM (2008, p.492), CAAM (2009, p.474), CAAM (2010, p.531). CAAM (2011, p.485), CAAM (2012, p.494, p.505).

The ROA for vehicle making business also showed a similar pattern as whole automobile industry but the returning rates of vehicle making business were relatively higher. However

<sup>11</sup> In fact vehicle parts makers of three countries, Japan, United States and German have occupied about 80% of global 100 parts maker ranking for a long time. In 2012 twenty nine Japanese parts makers got into the global 100 maker ranking, and United States, Germany was twenty five, twenty one each. But Chinese parts maker was only one, CITIC Dicastal Co., (ranking 92nd), therefore Chinese local parts makers have still a long way to go to reach the global level although China became number one country at vehicle production & sales volume (KAMA, 2013).

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both ROAs have mostly showed a growing movement since 2005. That is the reason why so many vehicle makers in China still try to expand their production capabilities in spite of a growing concern for excess facilities. In other words many makers regard that continuous investment for their assets is inevitable to create a sustainable development basis in China, and the level of China's vehicle market uncertainty is not so high.



**Figure 9: Average sales price & average profit trend per a vehicle in China**

**Source:** CAAM (2000, p.324, p.391), CAAM (2006, p.504, p.528, p.533, p.540), CAAM (2012, pp.478-479, p.500, p.505).

Such managerial opinions of vehicle makers about the market uncertainty might be more reasonable when considering the average sales price or the average profit per a vehicle of China. The average sales price per a vehicle continuously went up to 117.1 thousand RMB in 2003 from 44.4 thousand RMB in 1990 (Figure 9). But after 2003 it went up and down repeatedly at the range of 96.8 ~ 114.5 thousand RMB. The average profit per a vehicle generally maintained a growing momentum throughout last 20 years. It reached 17.1 thousand RMB in 2011 which higher than the average profit, 15.9 thousand RMB in 2003. Revenue to profit ratio for automobile industry of China moderately fluctuated and it reached 13.7% in 2011 which was the highest level for last 20 years. Revenue to profit ratio for vehicle making business exhibited a similar pattern as the profit ratio for automobile industry but it has been relatively higher since 1999. Consequently it is difficult to access the level of market uncertainty through revenue to profit ratio trend for overall automobile industry of China.

However, it needs to look into the individual maker's revenue to profit ratio to clarify the competitive position of leading players in China. In addition it can help approach the dynamic relation between major SOEs and their JVs. Above all top six SOEs' revenue to profit ratios went down in 2011 as compared with the ratios of previous years, and other local makers; Chery, Geely and BYD also showed very poor performances in 2011 (Table 5). But SAIC's profit ratios were relatively better than other SOEs, further most of its JVs took better places than other JVs. In 2011, the profit ratios of Shanghai GM Wuling, FAW-VW and Dongfeng Honda surpassed 20% but profit ratios of Tianjin FAW Toyota, Dongfeng Peugeot, Dongfeng

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Yueda KIA, Changan Ford Mazda did not reach 10% line. Actually most of profit ratios of major SOEs and their JVs had kept stable condition or showed rising tendency except 2011, so it can be said that it is too early to estimate the degree of market uncertainty at the point of each maker's performance. On the contrary most of major vehicle makers in China have few interests in market uncertainty while expecting more chances to grow in future. Accordingly acquisitions would be more desirable than equity alliances or nonequity alliances.

**Table 5: Revenue to profit ratio trend of major automobile makers of China (%)**

Major Firms	2007	2008	2009	2010	2011
<b>Shanghai Auto(SAIC)</b>	<b>15.6</b>	<b>19.2</b>	<b>18.2</b>	<b>18.5</b>	<b>16.2</b>
Shanghai GM(SGM)	16.9	11.0	17.9	19.9	13.2
Shanghai VW(SVW)	14.1	12.0	15.8	18.5	14.6
Shanghai GM(SGM) Wuling	11.0	16.1	14.4	15.1	22.4
Nanjing Automobile Co.	n.a	n.a	18.0	13.2	n.a
<b>First Auto(FAW)</b>	<b>15.5</b>	<b>12.7</b>	<b>16.8</b>	<b>17.8</b>	<b>9.0</b>
FAW VW	21.4	16.2	27.2	30.9	20.6
Tianjin FAW Toyota	15.6	15.5	17.1	18.8	8.5
FAW Car Co.	11.1	15.2	10.0	15.6	0.6
Tianjin FAW Xiali	9.3	6.2	5.5	7.0	2.7
<b>Dongfeng Motor(DFM)</b>	<b>14.2</b>	<b>11.6</b>	<b>16.1</b>	<b>18.7</b>	<b>12.9</b>
Dongfeng Nissan(Passenger Car)	13.7	13.1	16.3	23.9	16.6
Dongfeng Honda	22.4	28.7	28.2	25.3	25.1
Dongfeng Peugeot(Shenlong Auto)	12.2	8.0	15.4	19.4	8.1
Dongfeng Yueda Kia	4.7	10.1	11.9	15.4	9.3
<b>Changan Auto</b>	<b>11.6</b>	<b>10.2</b>	<b>10.2</b>	<b>10.0</b>	<b>4.8</b>
Changan Ford Mazda	16.0	13.7	15.3	18.0	6.6
Changan Hafei Automobile	3.6	3.5	8.4	8.1	n.a
Jiangxi Changhe Automobile	7.1	n.a	9.5	8.8	n.a
<b>Beijing Auto(BAW)</b>	<b>7.9</b>	<b>8.1</b>	<b>11.3</b>	<b>13.6</b>	<b>8.8</b>
Beijing Hyundai	12.2	12.6	17.5	20.1	12.5
Beijing Benz Automotive Co.	10.2	13.4	10.6	19.0	12.5
<b>Guangzhou Auto(GAIG)</b>	<b>20.9</b>	<b>18.7</b>	<b>14.8</b>	<b>21.9</b>	<b>8.3</b>
Guangqi Honda	21.4	20.6	20.3	23.0	9.9
GAC Toyota	19.3	18.7	24.8	27.9	10.8
<b>Chery</b>	<b>9.5</b>	<b>6.2</b>	<b>6.4</b>	<b>5.4</b>	<b>1.5</b>
<b>Geely</b>	<b>13.4</b>	<b>13.6</b>	<b>13.6</b>	<b>14.3</b>	<b>6.0</b>
<b>BYD</b>	<b>15.0</b>	<b>15.5</b>	<b>20.4</b>	<b>10.6</b>	<b>2.4</b>
Automobile Making Business of China	11.8	10.8	13.3	15.3	15.0
Overall Automobile Industry of China	11.1	9.7	12.7	13.7	13.7

**Source:** CAAM (2008, pp.498-501, pp.504-505), CAAM (2009, pp.480-483, pp.486-487), CAAM (2010, pp.536-538, pp.542-543), CAAM (2011, pp.490-493, pp.496-497), CAAM (2012, pp.500-502, pp.505-506).

### 4.5. Level of competition

In order to access the level of competition for resources it would be necessary to review the market concentration rate of major makers in China. When looking into the market share sum of top five makers' sales volume in China, it has kept an increasing pattern even though there were some fluctuation for last ten years since 2003 (Table 6). It reached 71.7% in 2012 from 65.1% in 2003. Also market share sum of top ten makers' sales volume went up by 7.2% point for the same period. So it can be said that the rivalry condition of China's automobile

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industry has been rapidly reorganized mainly with top ten makers. In fact some meaningful competitions among vehicle makers happened only by them, so the competition would not so intensive as before. In particular market control powers of top six makers; SAIC, DFM, FAW, Changan, BAW, GAIG, have been more and more reinforced (Table 3), and they have made a big entry barrier with the supports of local governments for procuring key resources like fuel efficiency technology, electric vehicle commercialization knowhow, R&D capability, brand awareness, sales or distribution networks. Whereas market shares of other makers like private makers or small & medium sized SOEs have been more and more insignificant.

**Table 6: Market share sum for major makers' sales volume (Passenger car & commercial vehicle) in China (%)**

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<b>Top Five Makers</b>	65.1	68.8	66.9	65.4	64.6	66.2	70.8	69.8	71.1	71.7
<b>Top Ten Makers</b>	80.1	83.6	83.6	83.9	83.1	83.4	87.2	85.5	86.9	87.3

**Source:** CAAM (2004, p.403, p.407), CAAM (2005, p.476, p.480), CAAM (2006, p.503, p.506), China Automobile Marketing Association (2008, pp.41-42), CAAM (2008, p.474, pp.476-477), CAAM (2009, p.455, pp.457-458), CAAM (2010, p.513, pp.515-516), CAAM (2011, p.467, pp.469-470), CAAM (2012, p.478, pp.480-481), China Association of Automobile Manufacturers ([www.caam.org.cn](http://www.caam.org.cn)).

**Table 7: Market share sum of major makers' sales volume for passenger car in China (%)**

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
<b>Top Five Makers</b>	40.2	54.4	42.5	40.4	37.3	35.1	35.4	34.4	38.0	39.7
<b>Top Ten Makers</b>	55.8	76.3	68.8	66.3	57.7	58.4	58.6	56.6	58.5	58.5

**Source:** CAAM (2004, p.403, p.407), CAAM(2005, p.476, p.480), CAAM (2006, p.503, p.506), China Automobile Marketing Association (2008, pp.41-42), CAAM (2008, p.474, pp.476-477), CAAM (2009, p.455, pp.457-458), CAAM (2010, p.513, pp.515-516), CAAM (2011, p.467, pp.469-470), CAAM (2012, p.478, pp.480-481), China Association of Automobile Manufacturers ([www.caam.org.cn](http://www.caam.org.cn)).

But the rivalry condition can be a different story if only focusing on passenger car sales volume. Market share sum of top five passenger car makers rarely changed for last ten years, 40.2% in 2003 and 39.7% in 2012 although it came down to 34.4% in 2010 (Table 7). All of top five makers were JVs; Shanghai GM (SGM), FAW Volkswagen (FAW-VW), SGM Wuling, Shanghai Volkswagen (SVW), Beijing Hyundai in 2012 (Table 8). In addition market share sum of top ten passenger car makers did not present a specific pattern, neither going up nor going down, with only 2.7% point change for last ten years. The market concentration level of passenger car manufacturing business has been relatively weak, therefore it can be inferred that many challengers still tries to enter top ten raking, and their threats are so strong as to disturb the market power increase of major makers.

If looking at the ranking change trend for top ten passenger car makers for recent five years, the competitions among top four JVs; SGM, FAW-VW, SGM Wuling, SVW were somewhat stable but the rivalry condition among other makers was relatively more intensive so that raking change occurred in every year. Electric vehicle (EV) launch oriented firm, BYD rapidly emerged as one of top ten makers with market share 4.3% in 2009 but stayed outside top ten ranking in 2012 due to a poor performance of EV sales.<sup>12</sup> However Chinese government still considers that its industry condition takes a relatively better position for EV

<sup>12</sup> Recently the sales performance of BYD was very poor and its EV and HEV models were still laid on weak position in domestic market as well as in abroad. The fleet sales contracts of EV for US or Europe were not realized yet until 2012, but BYD still tries to do the taxi fleet sales in Hong Kong. The reasons for such a sales depression of BYD are concerned with the technology deficiency of EV manufacturing, the delay of new model launch, the poor conditions of social overhead capital for EV operation (Flannery, 2012a; Flannery, 2012b).

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commercialization project than the industry conditions of developed countries (Dumaine, 2010).

**Table 8: Market share trend of major makers for passenger car in China  
(10 thousand, %)**

Rank	2012			2011			2010		
	Firm	Sales volume	Market share	Firm	Sales volume	Market share	Firm	Sales volume	Market share
1	SGM	136.4	8.8	SGM Wuling	130.1	9.0	SGM Wuling	113.6	8.3
2	FAW VW	132.9	8.6	SGM	118.6	8.2	SGM	101.2	7.4
3	SGM Wuling	132.3	8.5	SVW	116.6	8.1	SVW	100.1	7.3
4	SVW	128.0	8.3	FAW VW	103.5	7.2	FAW VW	87.0	6.3
5	Beijing Hyundai	86.0	5.5	DFM Nissan	80.9	5.6	Changan	71.0	5.2
<b>Top Five Sum</b>		<b>615.5</b>	<b>39.7</b>		<b>549.6</b>	<b>38.0</b>		<b>472.9</b>	<b>34.4</b>
6	DFM Nissan	77.3	5.0	Beijing Hyundai	74.0	5.1	Beijing Hyundai	70.3	5.1
7	Changan	60.4	3.9	Changan	67.8	4.7	Chery	67.5	4.9
8	Chery	55.0	3.6	Chery	64.2	4.4	DFM Nissan	66.1	4.8
9	FAW Toyota	49.6	3.2	FAW Toyota	50.0	3.5	BYD	52.0	3.8
10	Changan Ford	49.4	3.2	BYD	44.9	3.1	FAW Toyota	50.6	3.7
<b>Top Ten Sum</b>		<b>907.1</b>	<b>58.5</b>		<b>850.4</b>	<b>58.8</b>		<b>779.4</b>	<b>56.6</b>
Rank	2009			2008					
	Firm	Sales volume	Market share	Firm	Sales volume	Market share			
1	SGM Wuling	97.7	9.5	SGM Wuling	58.6	8.7			
2	SVW	72.8	7.0	FAW VW	49.9	7.4			
3	SGM	70.8	6.9	SVW	49.0	7.3			
4	FAW VW	66.9	6.5	SGM	43.2	6.4			
5	Beijing Hyundai	57.0	5.5	FAW Toyota	36.6	5.4			
<b>Top Five Sum</b>		<b>365.3</b>	<b>35.4</b>		<b>237.3</b>	<b>35.1</b>			
6	DFM Nissan	51.9	5.0	Chery	35.6	5.3			
7	Changan	51.9	5.0	DFM Nissan	35.1	5.2			
8	Chery	50.0	4.8	Guangqi Honda	30.6	4.5			
9	BYD	44.8	4.3	Beijing Hyundai	29.5	4.4			
10	FAW Toyota	41.7	4.0	Changan	26.5	3.9			
<b>Top Ten Sum</b>		<b>605.6</b>	<b>58.6</b>		<b>394.6</b>	<b>58.4</b>			

**Source:** CAAM (2009, pp.457-458), CAAM (2010, pp.513-516), CAAM (2011, pp.469-470), China Automobile Marketing Association (2010, p.28, p.73), CAAM (2012, pp.480-481), China Association of Automobile Manufacturers (www.caam.org.cn).

Such a rivalry condition induced the price competition among passenger car makers in China. Lots of makers' average sales prices per a vehicle rarely went up for last 10 years. On the contrary some makers' average sales prices plummeted. For example the average sales price of SGM came down to 127 thousand RMB in 2011 from 161 thousand RMB in 2004, and the average price of SGM Wuling largely got down to 12 thousand RMB from 30 thousand RMB for the same period (Table 9). Besides Guangqi Honda, Beijing Hyundai, Changan Ford Mazda, Changan Hafei and FAW Xiali experienced the average price decline but Geely, BYD and Jiangxi Changhe showed stable price changes. Some makers' sales

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prices somewhat increased but if considering the personal income growth, consumer price rise or the performance improvement of passenger cars equipped with various high tech instruments, the vehicle price increase rate, 10~20% is hardly able to be considered a meaningful increase.

Accordingly it can be inferred that the intensive rivalry condition of passenger car business resulted in price competition with suppressing the price increase as much as possible in China. But it is hard to estimate the level of rivalry if considering overall rivalry condition of automobile industry including commercial vehicles. Based on the strategy selection framework it can be argued that equity alliance is more reasonable than acquisitions or nonequity alliances.

**Table 9: Average sales price trend per a vehicle of passenger car makers in China  
(10 thousand RMB)**

Major Makers	2004	2007	2008	2009	2010	2011
SGM Wuling	3.0	2.9	3.0	3.3	3.4	1.2
FAW VW	13.6	13.9	16.7	13.9	15.1	15.4
SGM	16.1	13.1	12.8	13.1	13.0	12.7
SVW	10.9	11.2	10.7	10.4	12.5	13.2
Chery	5.9	5.2	4.7	4.5	5.2	6.7
Guangqi Honda	16.0	14.0	14.8	13.9	14.4	13.7
GAC Toyota	n.a	8.1	17.4	18.4	18.5	18.5
FAW Toyota	12.7	15.2	14.6	13.2	14.2	13.4
Dongfeng Nissan	n.a	11.8	11.8	12.5	12.4	11.8
Beijing Hyundai	12.1	10.2	9.0	8.4	8.9	9.8
Beijing Benz	16.0	31.7	29.9	31.9	43.1	40.0
ChangAn Ford						
Mazda	n.a	12.9	12.1	11.5	11.5	11.4
Geely	5.1	5.3	5.8	5.0	5.1	5.3
BYD	n.a	4.6	4.9	4.7	4.1	4.7
Dongfeng PSA	9.5	9.1	8.6	8.5	9.5	9.5
FAW Xiali	4.2	3.4	3.5	3.6	3.6	3.7
ChangAn Hafei	3.0	2.2	3.1	2.4	2.1	2.2
Dongfeng Kia	7.5	8.3	8.5	9.3	8.9	9.9
Dongfeng Honda	n.a	14.5	15.2	16.0	21.4	17.1
FAW Car Co.	n.a	14.1	16.1	14.0	13.0	13.5
Jiangxi Changhe	3.6	3.1	3.4	3.4	3.4	3.3

**Source:** CAAM (2005, p.480, p.503), CAAM (2008, pp.476-477, pp.499-500), CAAM (2009, pp.457-458, pp.481-482), CAAM (2010, pp.515-516, pp.537-538), CAAM (2011, pp.469-470, pp.491-492), CAAM (2012, pp.480-481, pp.501-502).

## 5. CONCLUSION

At present overall development conditions of automobile industry of China make acquisitions be more desirable than nonequity alliances or equity alliances. According to the strategy selection framework suggested by Dyer *et al.* (2004) the automobile makers in China need to seriously consider the change of existing strategy mainly with JV contract, one type of equity alliances. Among five factors of framework, type of synergies, nature of resources, extent of redundant resources and degree of market uncertainty suggest that acquisitions are more required than alliances for vehicle makers in China. However at the level of competition it shows that equity alliances are relatively better than acquisitions. At the type of synergies, both Chinese SOEs and global makers have created reciprocal synergies through comprehensive JV contracts since late 1990s because SOEs could accumulate R&D

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capabilities and manufacturing experiences for passenger car business, whereas global makers were able to strengthen domestic market position as their own wills. At the nature of resources, labor productivity of vehicle making business of China had gone up very fast throughout 2000s due to 'My Car' boom in China even though it went down abruptly for recent a couple of years. However the labor productivity during 1990s was very low which means the relative value of human resources to production facilities was so low as to nonequity alliances had been more effective. Currently the relative value of human resources in vehicle making business of China can be assessed as medium level.

At the extent of redundant resources, the number of vehicle makers in China reached one hundred fifteen until 2011 but the necessity of restructuring for excess production facilities increases continuously when considering a big downturn of growth rate for vehicle sales volume after 2010. In addition the number of vehicle parts suppliers in China is required to cut down too, so acquisitions take a better position to facilitate such restructuring assignments. At the degree of market uncertainty, ROA (return on asset) for China's automobile industry had moderately fluctuated but it showed growing movement after 2005. Not a few vehicle makers still regard the manufacturing capability expansion as essential of sustainable development in China and the level of its market uncertainty is not so high. Further each maker's revenue to profit ratios for recent five years did not support for the argument that level of market uncertainty is high.

Finally at the degree of competition, the market position of top six SOE makers is as strong as not to permit other makers enter their group. Not only the market share sum of top five makers but also sum of top ten makers at China's automobile making business has gone up continuously, so it can be said that actual rivalry occurs mainly with these top makers but market shares of other players are gradually insignificant, as a result the rivalry would be more and more weaken as time goes on. However the market share sum of top ten makers for passenger car business did not show any particular pattern, neither going up nor down while moderately fluctuating. The degree of rivalry for passenger car business was relatively higher than entire vehicle business including commercial vehicles for recent ten years. Such a severe rivalry condition of passenger car business turned out as price competition among popular passenger car models. Overall, the competition level for automobile industry of China covers both sides, high and medium simultaneously.

Chinese industrial policies have regulated the number of JV that global makers can establish at vehicle making business as well as kept the equity holding of global makers be under 50% since early 1990s. In addition Chinese local governments have lots of interests for major vehicle makers in their administrative region to gain competitive advantages and to be a leading maker nationwide. Local governments have deeply involved in SOE management through inner communist party committees of each SOE. Also it would be hard to expect some change of existing regulations on global makers for the foreseeable future despite many arguments for the effectiveness of such restrictive policies. When considering the development conditions of automobile industry or the analysis outcomes through strategy selection framework for China's automobile industry, acquisition would be more desirable than nonequity alliance or equity alliance. But current governance structures of SOEs or 50:50 equity structures of JV makers will go on for a long time due to Chinese government intervention rather than market power or industrial variables' change. Therefore the institutional factors of China's automobile industry, in particular local governments' roles cannot be underestimated yet, further their engagement should be considered as the invisible key factor to access strategy selection of vehicle makers.

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# COMPARATIVE COST ANALYSIS OF PAPER PRODUCTION: TRADITIONAL VS. RECYCLING

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**Abstract:** Paper has been used for many years all over the world. It is one of the most consumed products in the world. The most important raw material source used for paper production is the cellulose obtained from trees. There are significant impacts of paper industry on the environment and economy during its traditional production process. Instead of using virgin raw materials, in many countries wastepaper are collected and reused by recycling which saves resources like energy, time, and raw material. In this study the traditional paper production (system 1) which uses a virgin raw material is economically compared with recycling option (system 2). The two systems are compared based on their investment, material, maintenance and operating costs considering the time value of money. Annual worth (AW) method is used for economic comparison. AW values of all estimated disbursements during the life cycle of the systems are presented. It is concluded that recycling is economically more advantageous than the traditional paper production.

**Keywords:** Recycling, Economic Comparison, Paper Production

## 1. INTRODUCTION

Sustainable development plays an important role in the design of our developing world. There are main requirements for sustainable development, which are, environmental protection, resource conservation, and social and economic development (Petek *et al.* 1996). The increasing amount of solid waste becomes an important problem against environmental protection in the world. Ongoing technological improvement and increasing population will make this problem worse. The largest category of solid waste generation is the waste paper products.

Population and consumption are increasing dramatically the world over and recently half of the world's population is living in urban areas. These facts are the major factors of the environmental problems. The solid waste is an important environmental issue especially in

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large cities. For that reason, world has developing systems for disposing of urban waste to improve environmental protection, but this is insufficient if we cannot reduce unsustainable consumption and production. The recycling process can be a solution for the growing solid waste problem, and it involves different stages such as separation, collection, and other processes until the material is ready for recycling. Recycling minimizes the use of energy, raw material and waste. It requires awareness, mutual effort and comprehension among the different segments of the society (Staniskis, 2012).

In Turkey, the municipalities are responsible for the collection and transport of the solid waste to the recycling plants. Solid waste problem receives increasing attention in recent years. There is a need for efficient solid waste management systems and also sufficient number of recycling plants to overcome this problem. According to Metin *et al.* (2003), the rate of municipal waste production is about one kg per inhabitant per day and the household rate is 0.6 kg per inhabitant per day. About 25% of the generated waste is recyclable, having a composition of about 30% paper and cardboard, 20–25% glass and 15–20% plastics. As paper wastes occupy substantial volume in collection trucks and landfills, they comprise the majority of the municipal solid waste.

According to the International Energy Agency (IEA) over one-third of the world's energy consumption and 36% of worldwide carbon dioxide (CO<sub>2</sub>) emissions are belonging to manufacturing industries (IEA, 2007). The production of paper and pulp, chemical, petrochemical, iron and steel, cement, and other mineral and metal materials account for more than two-thirds of these emissions (Xu *et al.* 2013).

Paper is one of the most consumed products in the world. Worldwide consumption of paper has risen significantly in the past years. The most important raw material source used in paper production is the cellulose obtained from trees. Pulp and paper process converts fibrous materials (i.e., wood, non-wood and recycled paper) into pulp, paper and paperboard. Energy use here is intensive and constitutes a significant portion of the pulp and paper production costs. Producing one ton of paper requires 5–17 GJ of process heat, depending on the paper type and on the technology applied. Therefore, the energy content of the different paper grades is comparable to that of other energy intensive products, such as cement or steel (Szabo *et al.* 2009). Overall, the pulp, paper and printing industry accounts for about 5.7% of global industrial final energy use (Xu *et al.* 2013).

There are significant impacts of pulp and paper industry on the environment and economy during its traditional production process. It is the sixth largest polluter after oil, cement, leather, textile, and steel industries discharging a variety of gaseous, liquid, and solid wastes into the environment (Muna and Sreekrishnan, 2001). The most known environmental impact of traditional paper production is the deforestation (Laurijssen *et al.* 2010). On the other hand, significant level of fossil fuel and electricity usage lead to greenhouse gas emission from the pulp and paper industry which is contributing to climate change problem (Szabo *et al.* 2009). The pulp and paper production is also too much water intensive industry and ranks third in the world, after the metal and chemical industries with respect to fresh water consumption (Avsar and Demirer, 2008). Furthermore, countries that have not enough raw materials (e.g. cellulose) like Turkey have to import pulp, which brings high costs in production (Ozdemir *et al.* 2013).

Eventually, solid waste recycling and reuse can be a solution to the environmental problems caused by the pulp and paper industry. Recycling is the series of activities by which discarded materials are collected, sorted, processed and used in the production of new products (King *et al.* 2006). In addition to wood, recycled paper forms an important raw material input in the paper-making process. According to Blanco *et al.* (2013) over the past decades, the recovery and utilization of recovered paper in the paper and board industry has increased throughout the world, that is; recovered paper demand increased from around 90

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million tons in 1990 to around 220 million tons in 2011. Today, recovered paper accounts for around 50% of total paper making fibres used at worldwide level. Fleiter *et al.* (2012) state that Europe has a leading position in reuse, as more than 50% of the paper is recycled.

Although paper recycling has many benefits, recycled paper usage is lower than the virgin paper. The United States used more than 72 million tons of paper products, but only 25.5% is made from recycled paper; this is 35% in Western Europe, almost 50% in Japan, and 70% in the Netherlands (Liu and Liptak, 2000). Legislative programs have been developing in several countries that require a certain percentage of recycled fiber content in newspaper, office paper, and other products, which can increase the quantity of paper available for recycling (Pfeffer, 1992).

Several studies examine the recycling of waste paper in the extend literature. Pati *et al.* (2006) study the economical analysis of paper recycling in comparison to wood as raw material, and state that paper recycling is an economical alternative to wood as a raw material. Pati *et al.* (2008) formulate a mixed integer goal programming model to assist in proper management of the paper recycling logistics system. The use of the model is demonstrated through a problem of paper recycling in India. The results obtained show that their model is a practical tool and can be used to assist in making proper decisions regarding the management of reverse distribution network for paper recycling system. Laurijssen *et al.* (2010) study the energy use and carbon dioxide emissions for paper production from three pulp types. Increased recycling permits an increase in biomass availability and reduces life-cycle energy use and carbon dioxide emissions. Miranda and Blanco (2010) measure the correlation between the collection rates and different variables that are; socio-economic, market conditions and structure of the paper and board industry, municipal waste generation (in kg per capita per year), environmental (ISO 14001 certifications and EMAS registrations), quality (ISO 9000) and forestry certifications (PEFC), and environmental awareness.

Recently, Schweiger and Sahamie (2013) study the design of a paper recycling network including external procurement, in-house recycling of paper, technology selection, and selling or disposing of co-products. They consider a combined continuous and discrete facility location problem solved by a hybrid Tabu Search approach to develop candidate facility locations. Blanco *et al.* (2013) study how paper recycling activities in Europe can be extended through different improvements along the paper value chain. They tried to identify the difficulties in paper recycling and ways to overcome them. They claimed that to increase paper recycling in Europe it is crucial to increase the availability of recovered paper through more efficient collection systems and limiting the competition with energy purposes and the exports. It is also necessary to widen sorting activities, which can be achieved by reducing sorting costs using automated sorting systems. There is also a need to increase the recyclability of paper products by the loyalty of printing and converting industries to use recycling-friendly printing inks and adhesives. Finally, environmental awareness of the citizens is still an important driver for increasing recycling activities, affecting all the stages along the paper recycling chain including recovery.

Saferi and Yusof (2013) review the literature to understand the right and suitable processing method for kenaf plant fiber and pineapple leaf leaves. They consider previous works studied by researchers to investigate pulping procedure of natural fiber and its effect on mechanical strength. Ozdemir *et al.* (2013) propose calcium carbonate as an alternative raw material for the traditional paper produced from cellulose. They compared two alternative paper production systems namely mineral paper production and traditional paper production from the points of environment, energy, and economy. They conclude that the mineral paper production is economically, and environmentally more advantageous than the traditional paper production.

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The rest of the paper is organized as follows: In section 2, a case study is presented to compare the two production options (recycling vs. traditional) with the results and discussions. In section 3, the paper is concluded.

### 2. CASE STUDY

In general, there are five principal steps in pulp and paper production: raw material preparation, pulping, bleaching, chemical recovery, and paper making (Chen *et al.* 2012). The investment and operating cost of paper production is examined with two different system alternatives. One is a traditional system without recycling option (system 1) and the other is with recycling option (system 2). In both systems, we have initial system investment and total maintenance & operating (M&O) cost. Initial system investment is defined as the first cost to purchase the system equipments and installation. In the literature it is also called as installed cost. Maintenance & operating cost is consisted of general expenses, material, workforce, electrical energy and water consumption, and maintenance costs.

Both systems have a capacity to produce 45,000 tons of paper per year. System 2 utilizes 50,000 tons of collected waste paper per year (5,000 tons is the scarp value). The cost parameters for traditional paper production system are obtained from professional organizations that produce paper, whereas the cost parameters for recycling system are gotten from the report by Hodul (2010), which is prepared for ministry of industry of Turkey (See Table 1).

**Table 1: Cost parameters (\$)**

	<b>System 1</b>	<b>System 2</b>
<b>Initial investment, \$</b>		
Machine and equipment	22,850,000	17,000,000
Transportation and insurance cost	200,000	170,000
Assembly cost	300,000	225,000
<b>Total</b>	<b>23,350,000</b>	<b>17,395,000</b>
<b>Annual Maintenance and operating cost, \$ per year</b>		
Raw material cost	13,000,000	5,800,000
Other material cost	500,000	700,000
Water and electricity	5,000,000	3,550,000
Workforce cost	550,000	630,000
Maintenance cost	200,000	185,000
General expenses	370,000	365,000
Marketing and sales expenses	815,000	815,000
Packaging cost	610,000	610,000
<b>Total</b>	<b>21,045,000</b>	<b>12,655,000</b>
Life, years	30	30

In order to conduct the economic study, annual worth (AW) method is used to evaluate each alternative. According to Blank and Tarquin (2012) for many engineering economic studies, the AW method is the most convenient one to use. Since the AW value is the equivalent uniform AW of all estimated receipts and disbursements during the life cycle of the project or alternative. It is easy to be understood by most individual acquainted with annual amounts, that is, dollars per year.

For mutually exclusive alternatives, selection guideline is simple, that is, select the alternative having minimum AW of cost value. Annual effective interest rate  $i$  is accepted as 8% per

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year. It is the opportunity cost of capital spent but not invested. Systems are compared for 30 years of life time  $n$ . It is assumed that both systems have no salvage value after 30 years. AW calculations for the systems are as follows:

$$\begin{aligned} AW_1 &= 23,350,000(A/P, 8\%, 30) + 21,045,000 \\ &= 23,350,000(0.08883) + 21,045,000 \\ &= 23,119,180 \end{aligned}$$

$$\begin{aligned} AW_2 &= 17,395,000(A/P, 8\%, 30) + 12,655,000 \\ &= 17,395,000(0.08883) + 12,655,000 \\ &= 14,200,198 \end{aligned}$$

Where;

$$(A/P, i, n) = \frac{i(1+i)^n}{(1+i)^n - 1}$$

According to the result of the economic analysis; system 2 has lower AW value. Explicitly, considering the initial investment and total maintenance & operating cost in paper production, the system with recycling option is economically more advantageous than the traditional paper production system, with the 8% per year investment opportunity foregone.

### 3. CONCLUSION

Paper consumption and consequently amount of waste paper products are high all over the world. When global paper production is considered, there is a serious demand for the raw material which is the cellulose obtained from trees. The paper industry is considered as a raw material and energy-intensive industry. By means of the increasing consumption rate of paper products unfavorable environmental impacts, high raw material usage, and high energy consumption occurs with the traditional paper production processes.

It is clearly seen from the economical analyses that paper production system with recycling option has less initial investment, maintenance & operating cost comparing to traditional paper production system, in total. These findings lead the recycling option not only to become environmentally but also economically more advantageous and more preferable than the traditional paper production system.

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# **EFFECT OF SENTIMENT ON THE BANGLADESH STOCK MARKET RETURNS**

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**Abstract:** This paper looks at Bangladesh stock market completely from behavioral perspective by introducing behavioral factors in the empirical asset pricing models. Lack of data of sentiment proxies constrains authors to use only few proxies, namely, TRIN (Trading Index), trade volume (turnover), number of IPOs per month and change in four-month moving average. We have found that TRIN and moving average significantly affect the residual market returns. This paper also investigates the impact of sentiment on returns of different size portfolios. Results show that the impact of TRIN and trade volume is strong for large and medium size portfolios. However, the effect of TRIN is either low or insignificant for small size portfolio, indicating less interest of investors for neglected stocks. Granger causality tests show that there is unidirectional causality from TRIN to stock returns and strong bi-directional causal relationship between moving average change and stock returns. When conditional volatility is taken into account, effect of sentiment on returns from market and size portfolios decreases and we mostly observe significant effect of sentiment on small size portfolios. Finally, in the presence of other market-wide risk factors, sentiment factors weakly explain individual stock returns. Overall, we conclude that sentiment is a non-negligible consideration for portfolio investors in Bangladesh.

**Keywords:** Market Sentiment, Bangladesh Stock Market, Emerging Stock Markets, Return Predictability

## **1. INTRODUCTION**

Investor sentiment may be defined as the propensity of investors to speculate. This attitude is related to the psychological state of mind of investors. In positive states, investors may follow their routine investment strategies whereas in negative states they take investment decisions with more consideration and analyses (Schwarz, 2002). Investors become less attentive in good time, which leads to mispricing of stocks (Dellavigna and Pollet, 2009).

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Brown and Cliff (2004) describe sentiment as the expectations of market participants to a norm. The average investor is a zero sentiment investor. On the other hand, a bullish (bearish) investor expects higher (lower) returns than an average investor does. High sentiment can push stock prices far away from their fundamental values. In 1996, Federal Reserve System Chairman Alan Greenspan used the term “irrational exuberance” to warn about the bubble in technology stock prices in the 1990s, although his speech could not stop the market from further rise of stock prices, eventually resulting in bubble burst in 2000. Shiller (2000) also blames the presence of sentiment as “irrational exuberance” which drove the prices of U.S. stocks well above their fundamental value. Thus, from behavioral perspective market sentiment could be a source of systematic risk, which should be priced.

In traditional finance theory, stock prices are equal to the present value of all expected cash flows. It also suggests that cross-section of expected returns is supposed to be explained by only cross-section of systematic risks and any mispricing should be driven away by the activities of arbitrageurs. Therefore, there is no role of investor sentiment on stock returns. However, there has been long debate on whether or not sentiment influences stock prices. Black (1986) explains how noise traders, being influenced by sentiment, behave irrationally in the market. De Long *et al.* (1990) provide evidence that noise trading influences equilibrium stock prices. In their model, arbitrageurs cannot drive away such disequilibrium and consequently sentiment is priced. Lee *et al.* (2002) also find that sentiment is a systematic risk that is priced. Swaminathan (1996) and Lee *et al.* (1991) find predictive power of individual investor sentiment on excess expected returns of small firms. Elton *et al.* (1998) provide evidence that investor sentiment does not influence returns of closed-end funds.

The recent research on developed markets has shown significant relationship between stock returns and the sentiment of the market (Barberis *et al.* 1998; Brown and Cliff, 2005; Kumar and Lee, 2006; Baker and Wurgler, 2006; Beaumont *et al.* 2008). Other studies find relationship between returns and sentiment conditional on firm characteristics or market states. Brown and Cliff (1999) find weak relationship between sentiment and stock returns in general although there is strong relationship between sentiment and small stock returns. Finter *et al.* (2012) show that market sentiment index explains the spread between the returns of sentiment stocks and sentiment insensitive stocks. Moreover, they find that stocks that are difficult to arbitrage and value are more sensitive to market sentiment. Baker *et al.* (2012) consider both local and global sentiment factors to investigate presence of sentiment on six major markets. They report that high sentiment causes low future returns for relatively difficult to arbitrage and difficult to value stocks. Antoniou *et al.* (2012) find that higher momentum of returns occurs in higher sentiment periods and momentum is absent during pessimistic periods.

Literature survey on Bangladesh stock market reveals that academicians in the past have used many factors to explain returns, but the relationship between systematic risk factors and return is found to be weak (Chowdhury and Sharmin, 2013). Even, stock beta fails to explain the cross-section of expected returns of the Dhaka Stock Exchange (DSE), the largest stock exchange in Bangladesh. Some studies on Bangladesh stock market show negative relationship between beta and returns (Basher *et al.* 2007). Baker and Wurgler (2006) argue that in case of young firms, extreme growth firms, small firms, and non-dividend-paying firms there is higher possibility of subjectivity of valuations, which leads to susceptibility to market sentiment. Thus, if the market itself is young, there should be even higher possibility of presence of sentiment.

Above discussion has also shown that even in the developed markets there is strong possibility of effect of sentiment when stocks are new and difficult to arbitrage. As emerging markets are dominated by individual investors and lack availability of quality information and professional financial analysts' services, it is not a surprise that the performances of these

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markets are likely to be influenced by sentiment of general investors. Short selling is not allowed in many emerging stock markets including Bangladesh market, which makes it difficult to respond to information quick enough to correct mispricing of stocks. Thus, this paper investigates Bangladesh stock market completely from behavioral perspective by introducing behavioral factors in the empirical asset pricing models.

### 2. SENTIMENT IN EMERGING STOCK MARKETS

Aitken (1998) finds that emerging stock markets experienced a sharp increase in autocorrelation in total returns at a time when institutional investors began to invest heavily in these markets. He suggests that sentiment of institutional investors toward emerging markets probably plays an important role in overshooting of asset prices. Doukas and Milonas (2004) report that there is no impact of investor sentiment on stock returns in Greek stock market. Their finding is valid across different size portfolios and mutual funds. Thus, investor sentiment is not a source of systematic risk.

Kling and Gao (2008) show that sentiment influences stock returns in the Chinese stock market. More precisely, although the mood of investors follows a positive feedback in the short-run, stock price and investor sentiment do not have a long-run relationship. Institutional investors are optimistic (pessimistic) when previous market returns are positive (negative). Moreover, pessimistic sentiment affects negative returns more than optimistic sentiment does to positive returns.

Canbas and Kandir (2009) use several indirect sentiment measures to examine their effect on future stock returns for the stocks listed in the Istanbul Stock Exchange and find that only turnover ratio, a proxy for sentiment, has the potential to predict stock returns. Zouaoui *et al.* (2011) use panel data of 15 European and U.S. stock markets and find that sentiment has more effect on stock returns in those countries where investors are prone to herd behavior and institutional investment is relatively low. Grigaliuniene and Cibulskiene (2010) examine the effect of sentiment in Scandinavian markets and report negative relationship between sentiment and future stock returns. Liu *et al.* (2011) consider the direct and indirect effects of sentiment factors on Taiwan stock market returns. Their results indicate that extreme sentiment indicator plays a critical role in determining changes in market returns.

Anusakumar *et al.* (2012) report that local as well as global sentiment influence stock returns of a sample of 13 Asian countries. Their findings indicate the presence of sentiment in the market and their result is robust to firm size, trading volume, sample period and alternative proxies. Zhuang and Song (2012) examine the relationship between investor sentiment and stock returns and volatility in the Chinese stock market. They report that investor sentiment has a strong impact on stock returns in the Chinese stock market. Rehman (2013) gives empirical evidence that stock returns of Karachi Stock Exchange, a market which primarily consists of retail investors, are also influenced by investor sentiments. Perez-Liston *et al.* (2014) investigate Dow Jones Islamic Equity indices to find that bullish shifts in sentiment in current period lower conditional future volatility.

### 3. DATA AND METHODOLOGY

There are two types of sentiment measures: direct and indirect. Investor surveys provide the direct measure of sentiment of the market. On the other hand, several indirect sentiment proxies are used in the extant literature. The most important or popular proxies for indirect sentiment measures are: aggregate net flows of equity mutual funds, put-call ratio, aggregate trading volume, first-day IPO returns, number of IPOs, short sales to total sales ratio, close-end fund discounts, bull-bear spread, and TRIN (TRading Index, also known as Arms Index).

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There is no survey-based sentiment measure for Bangladesh stock market. Lack of data of behavioral proxies constrains us to use only few factors (or their variation), namely, *TRIN*, trade volume, number of IPOs per month, number of BO (Beneficiary Owner) account changes and moving average. Since these variables are not readily available from data vendors, they are created from raw data. Usually, sentiment proxies contain common information. Consequently, researchers employ tools such as Kalman filter or principal component analysis in order to construct a single sentiment measure. Due to low correlation among these sentiment measures for Bangladesh market, we cannot construct a unified sentiment index. Monthly macroeconomic and stock market data are collected from International Financial Statistics and Thomson Reuters Datastream, respectively. BO account and IPO data are collected from Dhaka Stock Exchange. Since macroeconomic factors are sources of systematic risk, residual returns series are created by regressing market returns on macroeconomic factors. The regression model is

$$R_t = \alpha_0 + \alpha_1 IP_t + \alpha_2 IP_{t-1} + \alpha_3 INF_t + \alpha_4 INF_{t-1} + \alpha_5 INT_t + \alpha_6 INT_{t-1} + \varepsilon_t, \quad (1)$$

where *IP*, *INF*, and *INT* indicate monthly industrial production growth, inflation and interest rates, respectively. Thus, error term represents return, which is not explained by macroeconomic factors. We then regress  $\varepsilon$  on sentiment factors. The regression model to investigate the effect of sentiment on return is

$$R_{\varepsilon,t} = \beta_0 + \beta_1 TRIN_t + \beta_2 TRIN_{t-1} + \beta_3 VOL_t + \beta_4 VOL_{t-1} + \beta_5 IPO_t + \beta_6 IPO_{t-1} + \beta_7 MA_t + \beta_8 MA_{t-1} + \beta_9 OPCL_t + \beta_{10} OPCL_{t-1} + \epsilon_t, \quad (2)$$

where  $R_{\varepsilon,t}$  is the residual return derived from equation (1), *TRIN* is the *TRIN* (Arms) index, *VOL* is the aggregate of each firm's number of shares traded divided by total number of shares outstanding (i.e., aggregate turnover of the market), *IPO* is the number of IPOs in month *t*, *MA* is the number of stocks having positive change in four-month moving average divided by number of firms having negative change in their four-month moving average at time *t*, *OPCL* is the number of opening of BO accounts divided by number of closure of BO accounts at time *t*.

To estimate *TRIN* index we use the following formula:

$$TRIN_t = \frac{DECVOL_t / \#DEC_t}{ADVVOL_t / \#ADV_t} \quad (3)$$

Bullish period indicates that average advance volume is greater than the average decline volume, that is, *TRIN* is less than one. Likewise, if *TRIN* is larger than 1, it indicates bearish period. Thus, traditional *TRIN* Index was originally defined in such a way that it is counter intuitive. To solve this issue we invert each *TRIN* value and then take its logarithm. After this transformation, positive change in *TRIN* indicates higher sentiment.

## 3.1. Causal relationship between sentiment and stock returns

So far we have assumed that only sentiment of the market influences stock returns. That is, only sentiment is the cause of abnormal stock returns. However, it is possible that returns (Granger) cause sentiment to rise. Even, bi-directional (Granger) causality is possible too. We estimate the following pair of regressions to test Granger causality between one of the sentiment variables and equally weighted size portfolio or market returns:

$$R_{\varepsilon,t} = \sum_{i=1}^2 \alpha_i S_{i,t-i} + \sum_{i=1}^2 \beta_i R_{\varepsilon,t-i} + u_{1,t} \quad (4a)$$

$$S_{i,t} = \sum_{i=1}^2 \varphi_i S_{i,t-i} + \sum_{i=1}^2 \gamma_i R_{\varepsilon,t-i} + u_{2,t}, \quad (4b)$$

where it is assumed that  $u_{1,t}$  and  $u_{2,t}$  are uncorrelated and  $S_i$  refers to any of the three most important sentiment proxies, namely, *TRIN*, *VOL*, and *MA*.

## 3.2. Sentiment, returns and conditional volatility

In a recent study, Yu and Yuan (2010) suggest that investor sentiment has dramatic effect on the mean-variance tradeoff when GARCH and asymmetric GARCH models are used. Moreover, the effect of a negative shock to sentiment on stock returns may be different from a positive shock to sentiment on stock returns. Any asymmetric effect of sentiment on stock prices can be addressed by using a GJR-GARCH model of the following form:

$$R_{\varepsilon,t} = \theta_0 + \theta_1 h_t + \theta_2 \Delta SI_t + \varepsilon_t \quad (5a)$$

and

$$h_t = \gamma_0 + \gamma_1 \varepsilon_{t-1}^2 + \gamma_2 \varepsilon_{t-1}^2 I_{t-t} + \gamma_3 h_{t-1} + \gamma_4 (\Delta SI_{t-1})^2 D_{t-1} + \gamma_5 (\Delta SI_{t-1})^2 (1 - D_{t-1}), \quad (5b)$$

where  $h_t$  is the conditional standard deviation,  $\gamma_2$  is the asymmetric effect of volatility,  $\Delta SI_t$  is the change in sentiment index at time  $t$ ,  $D_{t-1}$  is an interactive dummy variable so that  $D_{t-1} = 0$  if  $\Delta SI_{t-1} < 0$  and  $D_{t-1} = 1$  if  $\Delta SI_{t-1} > 0$ . Coefficients  $\theta_2$ ,  $\gamma_4$  and  $\gamma_5$  indicate how change in sentiment affects mean return and if there is any asymmetric effect of sentiment on conditional volatility, respectively. Coefficient  $\theta_1$  suggests how change in sentiment affects returns through impact on conditional volatility.

Equations (5a) and (5b) can explain certain behavioral phenomena of traders – to be specific, noise traders. De Long *et al.* (1991) suggest two effects of sentiment on returns – “hold more” effect and “price pressure” effect in market due to the presence of noise traders. These traders are more motivated to trade based on sentiments. In a market like Bangladesh, uninformed individual traders dominate stock trading and these (noise) traders are considered to be bad-timers to enter the market. However, they want higher return from their investment. When noise traders hold more risky assets than sophisticated investors they might receive higher returns. This effect is known as “hold more” effect. This effect also indicates that return should go down during bearish market. The second effect refers to the fact that when noise traders are bullish, they demand more risky assets and push the stock prices up, resulting in lower expected return. Thus, if first (second) effect dominates then we should observe positive (negative) relationship between return and sentiment. This relationship can be detected by the sign and significance of  $\theta_2$ , the coefficient of  $\Delta SI_t$ .

Equation (5b) shows how conditional volatility is affected by investor sentiment. Two effects of volatility on return are suggested by De Long *et al.* (1991). First, noise traders enter the market in wrong time and thus they buy high and sell low, resulting in negative return (i.e., capital loss). In equation (5a), such phenomenon is exhibited by the negative relationship between conditional volatility and stock returns. This effect is known as “Friedman” effect. Second, noise traders increase market volatility as variability of belief of noise traders increases and they are compensated for taking higher risk, which reduces stock prices and increases return. This effect is called “create space” effect. In equation (5a), such phenomenon is exhibited by positive relationship between conditional volatility and stock returns. In equation (5a), significantly negative and positive  $\theta_1$  indicate presence of “Friedman” and “create space” effect in the market. In equation (5b),  $\gamma_4$  and  $\gamma_5$  determine the asymmetric effect of sentiment on conditional volatility of returns.

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## 4. ANALYSES OF RESULTS

Table 1 exhibits the effect of sentiment on the market returns. We use eleven combinations of four sentiment proxies. Results show that *TRIN* and *MA* (moving average) significantly affect the residual market returns. When only *MA* is used in model 8, adjusted  $R^2$  is only 0.09, but when both *MA* and *TRIN* are used in model 7, adjusted  $R^2$  jumps to 0.37. In all the models where *TRIN* is used, it is significant at 1%, which shows its strong impact on index returns. In most models, *VOL* (aggregate turnover) weakly explains market returns as its coefficients are significant at 10% level. Also, in most models, coefficients of *TRIN* and *VOL* are significantly positive contemporaneously whereas these are negative (although sometimes insignificant) in the lagged month.

Across all the models, lagged effects of *TRIN* and *VOL* indicate the dynamics of the behavior of stock returns with respect to market sentiment changes. Initially, high sentiment leads to higher stock prices and higher actual return. In the next period, investors realize the overreaction of the previous month, resulting in negative correction of stock prices. For *MA*, contemporaneous and lagged coefficients are significantly negative and positive, respectively. The explanation could be that this sentiment measure is constructed based on past performance, which has an inbuilt lagged market sentiment effect. Thus, the relationship between return and *TRIN*, *VOL* and *MA* is well-aligned and there exists no conflict among them. Interestingly, *IPO* (number of monthly IPOs) and *OPCL* (ratio of number of opening to number of closure of BO accounts) do not explain index returns. Although not reported here due to brevity, same regression models using residual equally weighted market returns as the dependent variable provide almost similar findings.

Table 2, 3, and 4 examine the impact of sentiment proxies by considering size portfolios because previous research on the U.S. markets shows that relationship between sentiment and stock returns is particularly strong for small firms. The reason is the fact that small stocks are more likely to represent hard to value and hard to arbitrage stocks. Table 2 provides the findings for large size portfolio. Model 2 uses all the variables including their lags and the adjusted  $R^2$  is 0.53. Effect of *TRIN* is strong as before. Moreover, besides *TRIN* and *MA*, *VOL* becomes significant at 1% level for almost all models. Model 4, which uses these three sentiment measures, has found all of them significant and the adjusted  $R^2$  is 0.46. The coefficients of *TRIN*, *VOL* and *MA* indicate the dynamics of the behavior of stock returns with respect to market sentiment almost the same manner as we have found in Table 1. Only difference is that the effects are more pronounced for large firms. Also as before, initially higher sentiment leads to higher stock prices and higher return, which is followed by subsequent corrections.

Table 3 provides the results for medium size portfolio. *TRIN*, *VOL* and *MA* again are the key sentiment variables to influence medium size portfolio returns. Table 4 gives similar results for small size portfolios. In size effect analyses, one observation strikes the most – as we move from large size portfolios to small size portfolios, adjusted  $R^2$  in general goes down. Comparison of coefficients and adjusted  $R^2$ s across similar models in presented in Tables 2, 3, and 4 clearly shows this fact. That is, the relationship between firm size and sentiment appears to be positive. It contradicts with the previous finding that small firms are more sensitive to market sentiment. For Bangladesh stock market, the reason for this is probably the fact that investors, in the absence of dependable information, demand large stocks and avoid less informative medium and small stocks. Consequently, market sentiment exerts more impact on stock prices of large stock portfolios. However, these models may be misspecified since other risk factors besides sentiment proxies and macroeconomic variables have not been considered.

Table 1: Impact of sentiment on market index returns

Model	Const.	TRIN	TRIN Lag	VOL	VOL Lag	VOL	VOL Lag	IPO	IPO Lag	MA	MA Lag	OPCL	OPCL Lag	Obs.	Adj. $R^2$
1	-1.6600 (-1.24)	7.4582 (6.07) <sup>***</sup>	-	0.0247 (0.45)	-	-0.2169 (-0.41)	-	-0.1866 (-1.49)	-	-0.0021 (-0.41)	-	-	-	89	0.32
2	-0.2969 (-0.19)	7.2611 (6.55) <sup>***</sup>	-1.7734 (-1.58)	0.0822 (1.17)	-0.1187 (1.24)	-0.0232 (-0.05)	-0.2557 (-0.50)	-0.2632 (-1.66) <sup>*</sup>	-	0.0015 (0.21)	0.1543 (1.39)	-0.0048 (-0.52)	-	75	0.45
3	-1.8443 (-1.56)	5.5590 (6.42) <sup>***</sup>	-0.7502 (-0.81)	0.1171 (1.71) <sup>*</sup>	-0.1142 (-1.71) <sup>*</sup>	0.1264 (0.27)	-0.0118 (-0.03)	-0.2605 (-1.68) <sup>*</sup>	-	-	0.2294 (2.14) <sup>**</sup>	-	-	106	0.36
4	-1.7834 (-1.61)	5.5723 (6.51) <sup>***</sup>	-0.7705 (-0.85)	0.1175 (1.74) <sup>*</sup>	-0.1122 (-1.72) <sup>*</sup>	-	-	-0.2583 (-1.69) <sup>*</sup>	-	-	0.2304 (2.18) <sup>**</sup>	-	-	106	0.38
5	-2.0213 (-2.14) <sup>**</sup>	6.0212 (7.06) <sup>***</sup>	-0.9229 (-1.01)	0.1236 (1.79) <sup>*</sup>	-0.1121 (1.69) <sup>*</sup>	-	-	-	-	-	-	-	-	109	0.33
6	-1.8183 (-2.64) <sup>**</sup>	6.1974 (7.27) <sup>***</sup>	-1.3027 (-1.46)	-	-	-	-	-	-	-	-	-	-	109	0.32
7	-1.6725 (-2.04) <sup>**</sup>	5.7334 (6.70) <sup>***</sup>	-1.1470 (-1.28)	-	-	-	-	-0.2591 (-1.70) <sup>*</sup>	-	-	0.2323 (2.20) <sup>**</sup>	-	-	106	0.37
8	-0.1724 (-0.24)	-	-	-	-	-	-	-0.273 (-2.47) <sup>**</sup>	-	-	0.4254 (3.2) <sup>***</sup>	-	-	150	0.09
9	-0.0399 (-0.04)	-	-	-	-	-0.2372 (-0.51)	0.2758 (0.59)	-	-	-	-	-	-	154	-0.01
10	-0.4203 (-0.45)	-	-	-	-	-0.1207 (-0.26)	0.4112 (0.90)	-0.3438 (-2.55) <sup>**</sup>	-	-	0.4164 (3.1) <sup>***</sup>	-	-	150	0.09
11	-0.2789 (-0.28)	-	-	0.1824 (2.27) <sup>**</sup>	-0.1546 (-1.99) <sup>*</sup>	-	-	-	-	-	-	-	-	110	0.03

**Note:** <sup>\*\*\*</sup>, <sup>\*\*</sup>, and <sup>\*</sup> indicate significance at 1%, 5% and 10% level, respectively. The regression model to investigate the effect of sentiment on return is  $R_{e,t} = \beta_0 + \beta_1 TRIN_t + \beta_2 TRIN_{t-1} + \beta_3 VOL_t + \beta_4 VOL_{t-1} + \beta_5 IPO_t + \beta_6 IPO_{t-1} + \beta_7 MA_t + \beta_8 MA_{t-1} + \beta_9 OPCL_t + \beta_{10} OPCL_{t-1} + \epsilon_t$ , where  $R_{e,t}$  represents the return, which is not explained by macroeconomic factors,  $TRIN$  is the TRIN (Arms) index,  $VOL$  is the aggregate of each firm's number of shares traded divided by total number of shares outstanding,  $IPO$  is the number of IPOs in month  $t$ ,  $MA$  is the number of stocks having positive change in four-month moving average divided by number of firms having negative change in their four-month moving average at time  $t$ ,  $OPCL$  is the number of BO accounts opening divided by number of BO account closing at time  $t$ .

Table 2: Impact of sentiment on equally weighted large size portfolio returns

Model	Const.	TRIN	TRIN Lag	VOL	VOL Lag	IPO	IPO Lag	MA	MA Lag	OPCL	OPCL Lag	Ob.	Adj. $R^2$
1	-2.0465 (-1.49)	8.4464 (6.73) <sup>***</sup>	-	0.0810 (1.45)	-	-0.7319 (-1.35)	-	-0.1731 (-1.35)	-	-0.0048 (-0.97)	-	89	0.38
2	0.0956 (0.06)	8.5775 (7.28) <sup>***</sup>	-3.7882 (-3.18) <sup>***</sup>	0.1794 (2.40) <sup>**</sup>	-0.1510 (-2.08) <sup>**</sup>	-0.5126 (-0.97)	-0.3410 (-0.63)	-0.3067 (-1.82) <sup>*</sup>	0.1301 (1.10)	-0.0032 (-0.44)	0.0015 (0.16)	75	0.53
3	-2.0292 (-1.69) <sup>*</sup>	6.0993 (6.94) <sup>***</sup>	-2.0354 (-2.17) <sup>**</sup>	0.2172 (3.13) <sup>***</sup>	-0.1290 (-1.91)	-0.2385 (-0.50)	-0.1839 (-0.49)	-0.3054 (-1.94) <sup>*</sup>	0.2477 (2.28) <sup>**</sup>	-	-	106	0.45
4	-2.2778 (-2.02) <sup>**</sup>	6.0974 (7.01) <sup>***</sup>	-2.0011 (-2.16) <sup>**</sup>	0.2138 (3.12) <sup>***</sup>	-0.1351 (-2.04) <sup>**</sup>	-	-	-0.3054 (-1.96) <sup>*</sup>	0.2417 (2.25) <sup>**</sup>	-	-	106	0.46
5	-2.4653 (-2.57) <sup>**</sup>	6.6761 (7.71) <sup>***</sup>	-2.2042 (-2.38) <sup>**</sup>	0.2177 (3.11) <sup>***</sup>	-0.1377 (-2.04) <sup>**</sup>	-	-	-	-	-	-	109	0.41
6	-1.2795 (-1.77) <sup>*</sup>	6.9874 (7.84) <sup>***</sup>	-2.7979 (-2.99) <sup>***</sup>	-	-	-	-	-	-	-	-	109	0.37
7	-0.9675 (-1.12)	6.3915 (7.12) <sup>***</sup>	-2.6354 (-2.82) <sup>***</sup>	-	-	-	-	-0.3417 (-2.14) <sup>**</sup>	0.2235 (2.02) <sup>**</sup>	-	-	106	0.41
8	-0.2551 (-0.37)	-	-	-	-	-	-	-0.3335 (-2.60) <sup>**</sup>	0.4453 (3.47) <sup>***</sup>	-	-	151	0.10
9	0.2957 (0.33)	-	-	-	-	-0.4848 (-1.07)	0.2026 (0.45)	-	-	-	-	155	0.00
10	-0.1378 (-0.15)	-	-	-	-	-0.3803 (-0.86)	0.2937 (0.66)	-0.3403 (-2.61) <sup>**</sup>	0.4368 (3.38) <sup>***</sup>	-	-	151	0.10
11	-1.0076 (-0.91)	-	-	0.3002 (3.49) <sup>***</sup>	-0.1992 (-2.38) <sup>**</sup>	-	-	-	-	-	-	110	0.09

**Note:** <sup>\*\*\*</sup>, <sup>\*\*</sup> and <sup>\*</sup> indicate significance at 1%, 5% and 10% level, respectively. The regression model to investigate the effect of sentiment on return is  $R_{\varepsilon t} = \beta_0 + \beta_1 TRIN_t + \beta_2 TRIN_{t-1} + \beta_3 VOL_t + \beta_4 VOL_{t-1} + \beta_5 IPO_t + \beta_6 IPO_{t-1} + \beta_7 MA_t + \beta_8 MA_{t-1} + \beta_9 OPCL_t + \beta_{10} OPCL_{t-1} + \varepsilon_t$ , where  $R_{\varepsilon t}$  represents the return, which is not explained by macroeconomic factors,  $TRIN$  is the  $TRIN$  (Arms) index,  $VOL$  is the aggregate of each firm's number of shares traded divided by total number of shares outstanding,  $IPO$  is the number of  $IPO$ s in month  $t$ ,  $MA$  is the number of stocks having positive change in four-month moving average divided by number of firms having negative change in their four-month moving average at time  $t$ ,  $OPCL$  is the number of BO accounts opening divided by number of BO account closing at time  $t$ .



Table 3: Impact of sentiment on equally weighted medium size portfolio returns

Mod.	Const.	TRIN	TRIN Lag	VOL	VOL Lag	IPO	IPO Lag	MA	MA Lag	OPCL	OPCL Lag	Ob.	Adj. $R^2$
1	-3.7051 (-1.98)*	6.2503 (3.64)***	-	0.2249 (2.95)***	-	-0.6593 (-0.89)	-	-0.2930 (-1.67)*	-	-0.0037 (-0.55)	-	89	0.25
2	-1.3177 (-0.54)	6.3224 (3.57)***	-3.2405 (-1.81)*	0.3519 (3.14)***	-0.2242 (-2.05)**	-0.7773 (-0.97)	0.3091 (0.38)	-0.4863 (-1.92)*	0.1337 (0.75)	0.0015 (0.14)	-0.0071 (-0.48)	75	0.32
3	-2.8884 (-1.79)*	4.5479 (3.84)***	-1.5605 (-1.24)	0.3714 (3.98)***	-0.2069 (-2.28)**	-0.5302 (-0.82)	0.3165 (0.51)	-0.4637 (-2.19)**	0.2399 (1.64)	-	-	106	0.31
4	-2.9709 (-1.96)*	4.4623 (3.81)***	-1.4708 (-1.18)	0.3729 (4.03)***	-0.2118 (-2.37)**	-	-	-0.4784 (-2.28)**	0.2416 (1.67)*	-	-	106	0.32
5	-3.4673 (-2.69)***	5.2830 (4.54)***	-1.7119 (-1.37)	0.3752 (3.98)***	-0.2133 (-2.35)**	-	-	-	-	-	-	109	0.28
6	-1.0915 (-1.09)	5.8198 (4.71)***	-2.7047 (-2.1)*	-	-	-	-	-	-	-	-	109	0.17
7	-0.3037 (-0.25)	4.9755 (3.98)***	-2.5595 (-1.96)*	-	-	-	-	-0.5537 (-2.48)**	0.2023 (1.31)	-	-	106	0.22
8	0.0591 (0.07)	-	-	-	-	-	-	-0.4497 (-2.98)***	0.4094 (2.7)***	-	-	151	0.09
9	-0.2991 (-0.29)	-	-	-	-	-0.3947 (-0.75)	0.6912 (1.31)	-	-	-	-	155	0.00
10	-0.4199 (-0.40)	-	-	-	-	-0.2267 (-0.44)	0.7971 (1.53)	-0.4823 (-3.15)***	0.3914 (2.6)**	-	-	151	0.09
11	-2.3526 (-1.90)*	-	-	0.4423 (4.46)***	-0.2618 (-2.73)***	-	-	-	-	-	-	110	0.15

Note: \*, \*\*, and \*\*\* indicate significance at 1%, 5% and 10% level, respectively. The regression model to investigate the effect of sentiment on return is  $R_{e,t} = \beta_0 + \beta_1 TRIN_t + \beta_2 TRIN_{t-1} + \beta_3 VOL_t + \beta_4 VOL_{t-1} + \beta_5 IPO_t + \beta_6 IPO_{t-1} + \beta_7 MA_t + \beta_8 MA_{t-1} + \beta_9 OPCL_t + \beta_{10} OPCL_{t-1} + \epsilon_t$ , where  $R_{e,t}$  represents the return, which is not explained by macroeconomic factors,  $TRIN$  is the  $TRIN$  (Arms) index,  $VOL$  is the aggregate of each firm's number of shares traded divided by total number of shares outstanding,  $IPO$  is the number of  $IPO$ s in month  $t$ ,  $MA$  is the number of stocks having positive change in four-month moving average divided by number of firms having negative change in their four-month moving average at time  $t$ ,  $OPCL$  is the number of BO accounts opening divided by number of BO account closing at time  $t$ .

Table 4: Impact of sentiment on equally weighted small size portfolio returns

Model	Constant	TRIN	TRIN Lag	VOL	VOL	VOL Lag	IPO	IPO Lag	MA	MA Lag	OPCL	OPCL Lag	Ob.	Adj. $R^2$
1	-3.3139 (-1.51)	2.7949 (1.39)	-	0.2735 (3.06)***	-	-	0.0786 (0.09)	-	-0.3596 (-1.75)*	-	-0.0059 (-0.51)	-	89	0.15
2	-0.9423 (-0.31)	3.0989 (1.43)	-3.3235 (-1.52)	0.4691 (3.42)***	-0.2982 (-2.23)**	-	-0.0786 (-0.09)	0.2681 (0.27)	-0.5245 (-1.70)*	0.0775 (0.36)	-0.0009 (-0.07)	-0.0048 (-0.27)	75	0.19
3	-2.6841 (-1.40)	2.4884 (1.77)*	-1.8967 (-1.27)	0.4816 (4.34)***	-0.2769 (-2.57)**	-	0.0237 (0.03)	0.2663 (0.36)	-0.4528 (1.80)	0.1813 (1.04)	-	-	106	0.23
4	-2.4986 (-1.39)	2.4608 (1.77)*	-1.8955 (-1.28)	0.4850 (4.43)***	-0.2734 (-2.58)**	-	-	-	-0.4578 (-1.84)*	0.1870 (1.09)	-	-	106	0.24
5	-3.4548 (-2.30)**	3.0361 (2.24)**	-1.9175 (-1.32)	0.4956 (4.52)***	-0.2672 (-2.53)**	-	-	-	-	-	-	-	109	0.22
6	-0.1149 (-0.10)	3.7453 (2.55)**	-3.2105 (-2.08)**	-	-	-	-	-	-	-	-	-	109	0.07
7	1.0029 (0.70)	3.1282 (2.08)**	-3.3100 (-2.11)**	-	-	-	-	-	-0.5568 (-2.08)**	0.1353 (0.73)	-	-	106	0.10
8	0.2703 (0.30)	-	-	-	-	-	-	-	-0.4244 (-2.55)**	0.3176 (1.91)*	-	-	151	0.06
9	-0.6829 (-0.61)	-	-	-	-	-	0.2691 (0.47)	0.3934 (0.63)	-	-	-	-	155	-0.01
10	-0.6603 (-0.56)	-	-	-	-	-	0.3745 (0.66)	0.6344 (1.11)	-0.4601 (-2.73)**	0.3068 (1.84)*	-	-	151	0.05
11	-3.0167 (-2.23)**	-	-	0.5460 (5.05)***	-0.3113 (-2.97)**	-	-	-	-	-	-	-	110	0.19

**Note:** \*\* and \*\*\* indicate significance at 1%, 5% and 10% level, respectively. The regression model to investigate the effect of sentiment on return is  $R_{e,t} = \beta_0 + \beta_1 TRIN_t + \beta_2 TRIN_{t-1} + \beta_3 VOL_t + \beta_4 VOL_{t-1} + \beta_5 IPO_t + \beta_6 IPO_{t-1} + \beta_7 MA_t + \beta_8 MA_{t-1} + \beta_9 OPCL_t + \beta_{10} OPCL_{t-1} + \epsilon_t$ , where  $R_{e,t}$  represents the return, which is not explained by macroeconomic factors,  $TRIN$  is the  $TRIN$  (Arms) index,  $VOL$  is the aggregate of each firm's number of shares traded divided by total number of shares outstanding,  $IPO$  is the number of  $IPO$ s in month  $t$ ,  $MA$  is the number of stocks having positive change in four-month moving average divided by number of firms having negative change in their four-month moving average at time  $t$ ,  $OPCL$  is the number of  $BO$  accounts opening divided by number of  $BO$  account closing at time  $t$ .

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Although sentiment proxies play an important role in explaining returns of market as well as large-, medium-, and small-size portfolios, the direction of causality is not yet explored. It is possible that returns instigate sentiment of uninformed retail investors. Table 5 addresses this issue by providing the results from Granger causality tests. Only variables – *TRIN*, *MA*, and *VOL* – are retained for the Granger causality tests because these variables show significant ability to explain stock returns in previous tables. In all four panels in Table 5, the unidirectional causality from *TRIN* to stock returns is observed. There is no causal relationship between *VOL* (turnover) and stock returns. It contradicts with the strong relationship between turnover and stock returns presented in previous tables. The reason possibly rests in the structure of the Granger causality models. We have used two lags (months) of sentiment proxies and returns in the model and the contemporaneous relationship is ignored, which consequently indicates absence of causal relationship between turnover and returns. Interestingly, results indicate strong bi-directional causal relationship between *MA* and returns of size as well as market portfolios.

**Table 5: Pairwise Granger causality tests**

Null	Obs.	F-statistic	P-value
<i>Panel A: Causality between equal-weighted market return and sentiment factors</i>			
<i>TRIN</i> does not Granger cause equal-weighted <i>market</i> returns	91	3.4884	0.03
Equal-weighted <i>market</i> returns do not Granger cause <i>TRIN</i>		0.3784	0.69
<i>VOL</i> does not Granger cause equal-weighted <i>market</i> returns	91	1.7654	0.18
Equal-weighted <i>market</i> returns do not Granger cause <i>VOL</i>		0.5729	0.57
<i>MA</i> does not Granger cause equal-weighted <i>market</i> returns	151	4.9794	0.00
Equal-weighted <i>market</i> returns do not Granger Cause <i>MA</i>		4.6277	0.01
<i>Panel B: Causality between large size portfolio return and sentiment factors</i>			
<i>TRIN</i> does not Granger cause <i>Large</i> portfolio returns	91	4.3466	0.02
<i>Large</i> portfolio returns do not Granger cause <i>TRIN</i>		0.9787	0.37
<i>VOL</i> does not Granger cause <i>Large</i> portfolio returns	91	0.9158	0.40
<i>Large</i> portfolio returns do not Granger cause <i>VOL</i>		0.9258	0.40
<i>MA</i> does not Granger cause <i>Large</i> portfolio returns	151	6.5711	0.00
<i>Large</i> portfolio returns do not Granger cause <i>MA</i>		5.2495	0.00
<i>Panel C: Causality between medium size portfolio return and sentiment factors</i>			
<i>TRIN</i> does not Granger cause <i>Medium</i> portfolio returns	91	2.9504	0.06
<i>Medium</i> portfolio returns do not Granger cause <i>TRIN</i>		0.3470	0.71
<i>VOL</i> does not Granger cause <i>Medium</i> portfolio returns	91	1.5990	0.21
<i>Medium</i> portfolio returns do not Granger Cause <i>VOL</i>		0.4312	0.65
<i>MA</i> does not Granger cause <i>Medium</i> portfolio returns	151	4.9219	0.00
<i>Medium</i> portfolio returns do not Granger cause <i>MA</i>		3.2507	0.04
<i>Panel D: Causality between small size portfolio return and sentiment factors</i>			
<i>TRIN</i> does not Granger cause <i>Small</i> portfolio returns	91	3.7193	0.03
<i>Small</i> portfolio returns do not Granger cause <i>TRIN</i>		0.5928	0.56
<i>VOL</i> does not Granger cause <i>Small</i> portfolio returns	91	1.9856	0.14
<i>Small</i> portfolio returns do not Granger cause <i>VOL</i>		0.2339	0.79
<i>MA</i> does not Granger cause <i>Small</i> portfolio returns	151	2.4283	0.09
<i>Small</i> portfolio returns do not Granger Cause <i>MA</i>		3.7625	0.03

We estimate the following pair of regressions to test Granger causality between one of the sentiment variables and stock indexes:

$$R_{\varepsilon,t} = \sum_{i=1}^2 \alpha_i S_{i,t-i} + \sum_{i=1}^2 \beta_i R_{\varepsilon,t-i} + u_{1,t} \quad (4a)$$

$$S_{i,t} = \sum_{i=1}^2 \varphi_i S_{i,t-i} + \sum_{i=1}^2 \gamma_i R_{\varepsilon,t-i} + u_{2,t}, \quad (4b)$$

where it is assumed that  $u_{1,t}$  and  $u_{2,t}$  are uncorrelated and  $S_i$  stands for any of the four factors considered in this study.

Table 6 gives the results of GJR-GARCH model for sentiment proxies *TRIN*, *VOL* and *MA*. When *TRIN* is used as the sentiment proxy (columns 2 through 5), conditional volatility of market affects market return significantly negatively. Thus, it is an evidence for the presence of “Friedman effect” in the Bangladesh stock market - i.e., noise traders fail to trade at the right time. Moreover, as shown by negative and significant  $\gamma_2$ , a negative shock to return causes stronger impact on conditional volatility than a positive one does. For large, medium and small portfolios, there is no relationship between conditional volatility and returns. Also, since  $\theta_2$  is always insignificant for all four portfolios, it appears that returns are independent of changes in sentiment (i.e., *TRIN*). This is an indication that when *TRIN* is used as the proxy for sentiment, we observe neither “hold more” nor “price pressure” effect in the market.

Next four columns (i.e., columns 6 through 9) show the results when *VOL* (aggregate turnover) is used as a sentiment proxy. Results show that there is significantly positive relationship between conditional volatility and returns of small size portfolio. Medium size portfolio also shows similar relationship, but at 10 percent level of significance. Changes in sentiment affect medium and market portfolio returns positively. Thus, medium size portfolio returns show both “hold more” and “create space” effect. Market returns also show “hold more” effect. Small size portfolio shows “create space” effect. In terms of equation (5b), we find that positive change in sentiment increases conditional volatility of small size as well as market portfolio returns. Medium size portfolio exhibits positive relationship between return and conditional volatility in response to both positive and negative change in sentiment. As shown by  $\gamma_2$ , portfolio conditional volatility of small, medium and market portfolio returns responds more to negative return shocks than to positive ones. Since for small and medium size portfolios, sentiment affects conditional variance and it, in turn, affects returns, we can suggest an important relationship between turnover and returns of these two size portfolios.

Four right-most columns of Table 6 show the results when *MA* is used as the sentiment proxy. Change in sentiment affects all four portfolio returns significantly negatively. Thus, excess demand by noise traders pushes the price upward, resulting in negative return-sentiment relationship or “price pressure effect”. Although it is observed that there is asymmetric effect for negative shock to sentiment on conditional volatility of market portfolio returns, mean equation shows there is no relationship between conditional volatility and return. However, for small size portfolio, decrease in sentiment significantly affects conditional volatility. As shown in the mean equation, this ultimately causes return to vary positively – the evidence of presence of “create space” effect. So, overall, sentiment plays the most remarkable impact on small firms.

Table 6: GJR-GARCH results for effects of individual sentiment proxies on portfolio returns

Cof.	Sentiment Factor – $TR/N$				Sentiment Factor – Turnover (VOL)				Sentiment Factor – Moving Average (MA)			
	Market	Large	Med.	Small	Market	Large	Medium	Small	Market	Large	Medium	Small
$\theta_0$	3.1034 (4.93)***	-11.1600 (-0.79)	-4.1881 (1.53)	-1.0021 (-0.65)	1.3525 (1.13)	-1.7845 (-0.35)	-4.2877 (-2.30)**	-3.7574 (-3.14)***	-7.7328 (-0.95)	1.7563 (1.71)*	-2.0448 (-1.35)	-2.3346 (-4.08)***
$\theta_1$	-0.4591 (-3.34)***	1.2326 (0.80)	-0.5106 (-1.26)	0.0195 (0.09)	-0.2444 (-1.196)	0.2277 (0.34)	0.6187 (1.94)*	0.5092 (2.34)**	0.9927 (1.11)	-0.2933 (-1.39)	0.2660 (1.05)	0.3167 (2.18)**
$\theta_2$	0.0694 (0.23)	0.2056 (0.21)	-0.0111 (-0.03)	-0.0943 (-0.14)	0.1676 (2.19)**	0.0954 (0.91)	0.2270 (2.10)**	0.1681 (1.38)	-0.3965 (-3.57)***	-0.6345 (-4.00)***	-1.5850 (-5.27)***	-0.6474 (-5.18)***
$\gamma_0$	13.6095 (3.68)***	37.47 (1.20)	10.5228 (1.73)*	-0.0810 (-0.12)	4.3591 (2.21)**	39.65 (1.70)	13.52 (2.45)**	2.2339 (2.29)**	36.75 (2.07)**	13.6218 (2.99)***	3.2179 (1.06)	6.7044 (2.90)***
$\gamma_1$	-0.0814 (-1.47)	0.0815 (0.27)	-0.0034 (-0.04)	0.0138 (7.77)***	-0.1271 (-121.9)***	0.1107 (0.34)	-0.1021 (-4.99)***	-0.0867 (-4.80)***	0.1414 (0.55)	-0.2365 (-4.84)***	0.3541 (2.13)**	0.3907 (4.63)***
$\gamma_2$	0.6405 (4.45)***	0.0461 (0.14)	0.3928 (3.30)***	-0.1191 (-2.45)**	0.9207 (5.04)***	0.1974 (0.59)	0.8569 (4.68)***	0.2176 (3.13)***	0.1189 (0.44)	0.5321 (5.53)***	-0.2751 (-1.60)	-0.2046 (-1.68)*
$\gamma_3$	0.5346 (4.81)***	0.4758 (1.18)	0.0698 (4.90)***	1.0527 (36.03)	0.5748 (6.71)***	0.2084 (0.62)	0.2592 (2.48)**	0.7886 (13.75)***	0.4868 (1.86)*	0.4461 (2.82)***	0.4327 (4.92)***	0.6411 (6.78)***
$\gamma_4$	0.0180 (0.06)	-0.1986 (-1.65)*	0.0090 (0.09)	-0.0249 (-0.68)	0.0178 (2.25)**	-0.0076 (-0.51)	0.0335 (1.90)*	0.0454 (3.16)***	-0.0996 (-1.96)**	0.6797 (1.42)	3.2264 (3.97)***	0.1247 (0.59)
$\gamma_5$	-8.5227 (-1.07)	-4.7587 (-0.71)	-8.2927 (-1.04)	-0.6966 (-0.64)	0.0240 (1.66)*	-0.0012 (-0.05)	0.0984 (6.06)***	0.0057 (0.23)	-6.3956 (-2.28)**	3.6587 (1.20)	0.4920 (0.11)	-4.6205 (-6.90)***
LL		-521.25	-533.50	-520.45	-498.09	-509.79	-519.54	-517.05	-513.25	-486.85	-509.94	-513.23

**Note:** \*, \*\*, and \*\*\* indicate significance at 1%, 5% and 10% level, respectively. The effect of negative shock to sentiment on stock returns should be different from a positive shock to sentiment on stock returns. Asymmetric effect of sentiment on stock prices can be addressed using a GJR-GARCH (Glosten et al., 1993) model of the following form:

$$R_{e,t} = \theta_0 + \theta_1 h_t + \theta_2 \Delta S_{t-1} + \varepsilon_t \text{ and} \quad (5a)$$

$$h_t = \gamma_0 + \gamma_1 \varepsilon_{t-1}^2 + \gamma_2 \varepsilon_{t-1}^2 I_{t-1} + \gamma_3 h_{t-1} + \gamma_4 (\Delta S_{t-1})^2 D_{t-1} + \gamma_5 (\Delta S_{t-1})^2 (1 - D_{t-1}), \quad (5b)$$

where  $h_t$  is the conditional standard deviation,  $R_{e,t}$  is the return not captured by macroeconomic risk factors,  $\gamma_2$  is the asymmetric effect of volatility,  $\Delta S_{t-1}$  is the change in sentiment index,  $D_{t-1}$  is a dummy variable so that  $D_{t-1} = 0$  if  $\Delta S_{t-1} < 0$  and  $D_{t-1} = 1$  if  $\Delta S_{t-1} > 0$ . Coefficients  $\theta_2$ ,  $\gamma_4$  and  $\gamma_5$  indicate how sentiment affects mean return and if there is any asymmetric effect of sentiment on conditional volatility.

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In sum, when conditional volatility models are used to find the relationship between sentiment and returns of market and size portfolios, results vary. It is not a surprise because we have found low correlation between sentiment proxies which is reason not to have a unified sentiment variable. When turnover and moving average are used as proxy, small firm portfolios show significant relationship between sentiment and conditional volatility and returns. This result is different from what we see Table 2, 3, and 4 – where we have found positive relationship between effect of sentiment and firm size.

So far, whole discussion has focused on the returns of portfolios. These returns are either derived from size portfolios or from market portfolio. Thus, it is important to know how individual stock return behaves with respect to changes in market sentiment. Table 7 provides the summary results of basic regressions that consist of explanatory variables *TRIN*, *VOL*, and *MA*. The total number of significantly positive and negative coefficients and that of significant coefficients in absolute values are reported. Panel A and Panel B provide number of significant coefficients at 5% and 10% levels, respectively. Two models are used – one with only the sentiment variables and other one with additional market risk factors.

Panel A of Table 7 shows that *TRIN* and *VOL* are the most important sentiment factors that influence individual stock returns in the absence of other market risk factors. Contemporaneous effect of *TRIN* is almost always positive whereas lagged effect of *TRIN* is usually negative. Sentiment proxy *VOL* and its lag influence individual stock returns almost similar manner. The effect of *MA* on individual firm returns is relatively weak. When market risk factors – small minus big, cross-sectional volatility, and market return – are included, effect of *TRIN* and *VOL* becomes weak. Panel B shows similar results. As expected, number of significant coefficients goes up with significance level. Other than that, the basic implication of Panel A and Panel B is very similar.

This finding suggests that sentiment factors explain individual stock returns because these are probably also proxies for market risk. Thus, sentiment factors weakly explain the returns of individual stocks when additional market risk factors are included in the model. This phenomenon can also be explained from the viewpoint of findings of Vuolteenaho (2002) where he shows that firm level stock returns and portfolio returns are mainly influenced by cash flow news and expected return (i.e., discount rate) news, respectively. The fundamental value of a firm is the present value of all future cash flows, suggesting the importance of both cash flows and discount rates information in valuation. He points out that cash flow news is a firm-specific factor, which can be diversified in a portfolio whereas discount rate information is derived from market-wide risk factors, which cannot be diversified away. Since sentiment is a source of market-wide risk, it should have more influence on portfolios than on individual stocks. This explanation tells us the possible reason for strong impact of sentiment on portfolio returns and weak impact of the same on individual firm returns.

Table 7: Summary results of individual regressions

	Const.	TRIN	TRIN Lag	VOL	VOL Lags	MA	MA Lag	SMB	VOLT	MARK
<i>Panel A: Significance level 5%</i>										
Significantly positive coeffs.	0	149	2	118	0	1	11	-	-	-
Significantly negative coeffs.	14	1	29	0	63	25	2	-	-	-
Total significant coeffs.	14	150	31	118	63	26	13	-	-	-
Significantly positive coeffs.	4	18	14	11	9	3	11	52	10	216
Significantly negative coeffs.	14	8	9	11	23	2	2	65	3	0
Total significant coeffs.	18	26	23	22	32	5	13	117	13	216
<i>Panel B: Significance level 10%</i>										
Significantly positive coeffs.	2	164	4	147	1	1	14	-	-	-
Significantly negative coeffs.	24	1	61	0	83	50	3	-	-	-
Total significant coeffs.	26	165	65	147	84	51	17	-	-	-
Significantly positive coeffs.	5	25	22	15	10	6	14	62	18	226
Significantly negative coeffs.	23	15	15	19	35	6	2	77	5	0
Total significant coeffs.	28	40	37	34	45	12	16	139	23	226

The regression model to investigate the effect of sentiment on return is  $R_{e,i,t} = \beta_0 + \beta_1 TRIN_t + \beta_2 TRIN_{t-1} + \beta_3 VOL_t + \beta_4 VOL_{t-1} + \beta_5 MA_t + \beta_6 MA_{t-1} + \epsilon_{i,t}$ , where  $R_{e,i,t}$  represents the return of any firm  $i$ , which is not explained by macroeconomic factors,  $TRIN$  is the TRIN (Arms) index,  $VOL$  is the aggregate of each firm's number of shares traded divided by total number of shares outstanding,  $MA$  is the number of stocks having positive change in four-month moving average divided by number of firms having negative change in their four-month moving average at time  $t$ . To get rid of effect of other systematic risk factors, we include three market-related factors – cross-sectional market risk ( $VOL7$ ), market return ( $MARK$ ), and the spread between small and large firms ( $SMB$ ) – in the model above.

## 5. CONCLUSION

This paper looks at Bangladesh stock market completely from behavioral perspective by considering five indirect sentiment proxies in the empirical asset pricing models. Findings show that sentiment affects portfolio returns. The results are robust to firm sizes. Moreover, there is unidirectional causal relationship from TRIN to stock returns and bi-directional causal relationship between past change in moving average and stock returns. As emerging markets are dominated by uninformed individual investors and lack the availability of quality information and professional financial analysts' services, it is not a surprise that the performances of these markets are subject to sentiment of general investors. Interestingly, large size portfolios are more prone to sentiment than small size portfolios are. Previous studies show that even in the developed markets there is higher possibility of effect of sentiment when stocks are new and difficult to arbitrage and mostly small firms fall in this category. The possible reason for this difference in finding is that large stocks are usually more in demand in Bangladesh due to their better accounting practices and transparent information dissemination. Thus, sentiment affects large stock portfolio returns more than other portfolio returns. In the Bangladesh stock market, sentiment appears to be a source of market risk, which cannot be diversified away and hence it should be priced. Consequently, it is plausible that behavioral factors should also be considered in empirical asset pricing models for other emerging stock markets. It seems that the role of fundamentals is rather limited in the Bangladesh stock market. In the absence of dependable earnings information, sentiment-based trading is indeed a good option for portfolio investors and managers in such a market.

Results also indicate the possible dynamic relationship between the behavior of individual stock returns and market sentiment. Higher sentiment contemporaneously leads to higher stock prices. In the next period, investors realize the overreaction of the past period, resulting in negative correction of stock prices. In the presence of other market-wide risk factors, sentiment factors weakly explain individual stock returns although we have already found strong impact of sentiment on portfolio returns. We suggest that cash flow news is a firm-specific factor, which can be diversified in a portfolio whereas discount rate information is derived from market-wide risk factors, which cannot be diversified away. Hence, sentiment, a source of market-risk, is priced for portfolios, but not for individual firms.

When conditional volatility is taken into account, effect of sentiment on market and size portfolios decreases to a large extent. We mostly observe significant effect of sentiment on small size portfolios. The effect of sentiment also depends on selection of sentiment proxy. It is not surprising since there is low correlation between sentiment proxies used in this study. Aggregate market turnover and ratio of number of firms with positive change to negative change in three-month moving average shows more impact on market and size portfolio returns. There is also evidence of "price pressure" effect – that is, sentiment pushes the price up, causing reduction in stock returns.

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