DETERMINANTS AND IMPACT OF FOREIGN DIRECT INVESTMENT IN CHINA:

A National and Regional Analysis

by

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CERTIFICATE OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this thesis, that the original work is my own except as specified in acknowledgments or in footnotes, and that neither the thesis nor the original work contained therein has been submitted to this or any other institution for a degree.

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Abstract

Since the late 1970s, the Chinese economic system has experienced a series of economic reforms, which include attracting foreign direct investment and the liberalisation of Chinese international trade. Due to the successful reform, China has experienced a 30 year economic growth. Previous empirical studies found the positive effect of FDI in the Chinese economic development.

This study plans to investigate the factors which attract the investment to China and the impact of the inward FDI on international trade and Chinese economic development under the geographic location condition.

OLI model has emphasis the location effect in motivated FDI flows. The first research question is the determinant of FDI in China with concerning the geographic effect. Different with the previous empirical paper on the FDI determinants in China, the using the geographic effect as an dummy variable in the specification, this study investigate the effect of the other determinant under different geographic background. The geographic effect has been explore in two levels: national level and regional level. On national level, there are two countries have been selected as research samples: the investment from the U.S. and the investment from Japan. These two countries have similar economic size and FDI stock in China but have different geographic relationship with China. Through the ARDL research approach, this study finds that the key drivers of inward investment are relative wages, relative capital cost, market size and net exports, although the source of these FDI flows is also found to be important especially those from the USA and Japan. The determinants of FDI from the US and Japan have different effect. International trade has negative effect of export from US to China on the US FDI stock in China, while it has positive coefficient of the exports from Japan to China on the Japanese FDI. The large market size would drive the FDI from US but reduce the FDI from Japan. The geographic effect influences the motivation of FDI (Helpman 1984, Cushman 1988). This further lead the determinants has different effect.

The study on regional FDI divided the Chinese provinces in two subgroups: the eastern coastal area and the western hinterland. The eastern area has more than 80% of FDI in China. The eastern coastal has rich resource in the transportation, openness, physical and human capital. The west hinterland area has cheaper labours. However, the result shows that the competition in the sub-regions are determined by it scare resources. Cheaper wage is the key factor to attractive the investment to the east regions. While the technology, human capital and economy openness is the key factors to determine the FDI stock in the west hinterland.

The second research question is the impact of FDI on international trade. Chapter 6 investigates the plausibility of FDI driving trade. The granger causality test has been applied to test the endogenity between international trade and FDI stock in China, the results does not support the causality. The further regression results show that this model is not substantiated by the data, so the maintained hypothesis that FDI is the dependent variables seems to be appropriate for China.

The third contribution is to examine the effects of FDI on economic growth. In this panel data analysis the impact of FDI on the regions of the country is examined. Furthermore, the impact on the sub-regions groups has also been explored. The results show that economy of the east coastal area in China is motivated by the inward FDI stock. However, due to the limitation of the catch-up capability, FDI has negative effect on the development of the hinterland in China. The hinterland economy is driven by the international trade, although the transportation resource in the hinterland is not as rich as ones in the eastern coast.

Key words: Foreign Direct Investment, International Trade, Chinese Economy

Abbreviations

ADF	:	Augmented Dickey-Fuller
AIC	:	Akaike Information Criterion
AR	:	Autoregressive
ARDL	:	Autoregressive Distributed Lag
ASEAN	:	Association of Southeast Asian Nations
BRIC	:	Brazil, Russia, India and China
CIA	:	Central Intelligence Agency
DF	:	Dickey-Fuller
EPO	:	Europe Patent Office
EU	:	European Union
FDI	:	Foreign Direct Investment
FE	:	Fixed Effects
GDP	:	Gross domestic product
GLS	:	Generalized least squares
GNP	:	Gross National Product
GMM	:	Generalized Method of Moments
JP	:	Japan
IMF	:	International Monetary Fund
IV	:	Instrumental Variables
OECD	:	Organisation for Economic Co-operation and Development
OLI	:	Ownership – Internalisation- Location
OLS	:	Ordinary Least Squares
PLC	:	Product Life Cycle
PCT	:	Patent Cooperation Treaty
PP	:	Phillips-Perron
RE	:	Random Effects
REER	:	Real Effective Exchange Rate
RMB	:	Renminbi
SBC	:	Schwartz Bayesian Criterion
SDR	:	Special Drawing Rights
SK	:	South Korea
SSB	:	Chinese State Statistics Bureau

TW	:	Taiwan
UNCTAD	:	United Nations Conference on Trade and Development
UNCTADSTAT	:	United Nations Conference on Trade and Development Statistics
UK	:	United Kingdom
USA	:	United States of America
VAR	:	Vector Autoregression
VECM	:	Vector Error Correction Model
VIF	:	Variance Inflation Factor
WEO	:	World Economy Outlook
WIPO	:	World Intellectual Property Organization
2SLS	:	2 stage least squares

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Chapter 1. Introduction

1.1 Background and objectives

During the process of globalisation, multinational firms have developed beyond the national borders. They set production and/or services clients in more than one country, separate innovation and production process geographically and make business decisions from a global perspective. They become an important component of the world economy.

This study plans to investigate the factors which attract the investment to China and to explore the interrelationship between the inward FDI in China, international trade and Chinese economic development under the geographic location condition.

China has become the world's largest FDI recipient country after the 30 years development[1]. It has its natural comparative advantages in attracting foreign direct investment. Firstly, China has huge market size to attract market-seeking FDI. The multinational firm in large market benefits the scale of economy and attracts the investment from multinational enterprises (Morre, 1993; Venable 1995, 1996, 1998). According to the Central Intelligence Agency (hereafter, CIA) statistic ranking, Chinese GDP in 2010 reached $9,872 billion, making it the third largest economy behind the EU with $14,890 billion and the United States with $14,720 billion (CIA Factbook, 2011). The large host market effect stimulates the market seeking investment (Helpman, 1995).

Secondly, China has comparative advantages in labour factor endowment to attract efficient-seeking FDI. China has the world largest labour pool to support the

[1] This study applies the economic concept of China rather than the political concept. 'China' in this study refers to the mainland China. The investments from Hong Kong, Macau and Taiwan to mainland China are considered as foreign direct investment.

production activities of multinational enterprises[2]. The large volume of cheap labour reduces the production cost and attracts the efficient-seeking type FDI into China, in particular, the FDIs in the labour-intensive production industry (Vernon, 1966).

This third advantage is the stable investment environment. The Chinese economy has experienced 30 years continues growth.[3] FDI, usually, is a long-run investment process, the economic potential to raise the confidence of investors and therefore, stimulate inward FDI.

Another research focus of this study is the interrelationship between international trade, inward FDI and economic growth.

The influence of multinational firms on the less developed economies, in particular, on the emerging economies, is significant. Multinational firms bring new developing opportunities for these countries to integrate into the world economy via this international cooperation. China's authorities maintained a particularly high expectation on FDI, because it brings not only the physical capital, but also new advanced technological advancements, which enhances its competitiveness in the world economy and speeds up its industrial structure transformation. Since the late 1970s, the Chinese economic system has experienced a series of economic reforms, which have aimed to transform it from a "planned economy" towards a "market economy". In order to attract foreign direct investment, the central and municipal governments applied various policies to encourage multinational firms to set-up in China. In the past 30 years, the Chinese economy has made significant progress alongside the development of inward FDI.

International trade is an alternative channel to connect the Chinese economy with the world economy. In the past 30 years, Chinese international trade had a sustainable

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[2] To illustrate this, in 2010, the labour force in China reached 819.5 million, which was more than 5 times the labour force in the United States at 153.9 million and three times the EU labour force at 225.2 million.

[3] It has maintained positive GDP growth rate since the 1980s. Even during the 1997 Asian financial crisis and 2008 subprime mortgage crisis, China still maintained a positive annual GDP growth rate in the range of 7% to 10%.

increase, as a result of the trade liberalisation reform implemented by the Chinese government. It became the 2nd largest exporting country in the world and the 3rd largest importing country (CIA Factbook, 2011). The development of Chinese international trade is alongside the development of the inward FDI and the Chinese economy.

China is an ideal economy for research on the relationship between FDI, international trade and regional economy. During the Chinese economy transformation process, the development of FDI in China is closely related with Chinese trade liberalisation and economic development.

Different from the previous studies on FDI in China, this study emphasises the impact of geographic location in cross-border capital movement to China. The geographic factor not only influences the business costs, but also the nonfinancial cost, such as information certainty, monitoring costs or culture adoption costs (Solocha and Soskin 1990, 1994; Davidson, 1980; Barnard 1993).

China is an ideal economy to explore the geographic influence on multinational firm activities. On the national level, China is the world's largest developing economy located in East Asia. It is geographically close to Japan, South Korea, other Greater China regions[4] and ASEAN[5] countries, but far away from two important economies: the USA and the EU. The Greater China, ASEAN, the USA and the EU countries are important FDI resource regions and trade partners of China. It is interesting to explore how geographic characteristics influence the FDI and trade relationship.

Furthermore, the economic development within the Chinese border can be catalogued into two groups: the eastern regions (alongside the coast) that maintain much higher GDP growth rate in comparison to the western regions (which belong to the

[4] Greater China is a geographic concept widely used in business. The term refers to the regions with ethnic Chinese cultural ties, which usually includes mainland China, Hong Kong, Macau, Taiwan, Singapore, Malaysia.

[5] The Association of Southeast Asian Nations, a geo-political and economic organization of ten countries located in Southeast Asia, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Brunei, Burma (Myanmar), Cambodia, Laos, and Vietnam.

hinterland). More than 80% of the FDI are located in the east. To further understand the geographic influence, it is meaningful to compare the interrelationship between FDI, trade and economic growth in the eastern and the western areas.

This study explores the determinants and impacts on two geographic levels: national level and regional level. The national level research applies a time series approach which investigates both the long-run and short-run relationships. The regional level research applies a panel approach.

The main objective of the study is to investigate the determinants of FDI and the impact of the FDI in China over the past 30 years. It is concerned with four main research questions:

a. What are the main determinants of FDI to locate in China? How does Chinese GDP and openness to trade influence inward FDI? Is there any difference in the incentives between the investments from the U.S.A., which is geographically far away from China, and its neighbouring Asian – Japan? How do the geographic factors influence the FDI motivations?

b. What is the determinant of Chinese export and import? How does FDI influence these export and import activities? Is there any geographic restriction?

c. What are the determinants of the FDI distribution in China? Is the impact of determinants in the eastern coastal area different from ones in the western hinterland?

d. What is the impact of inward FDI and international trade on the development of Chinese regional economy? Is the effect different between the eastern coast and the west hinterland?

The first question investigates the important factors of inward FDI stocks in China at national level. Besides the market power effect (both home market and foreign markets), and the international trade influence, the study further takes account of the capital cost, wage cost and exchange rate effect. Efficiency-seeking multinational firms move the production into regions with cheaper production costs in order to enhance competitiveness as long as production can be standardized (Vernon, 1966). Cheaper labour and capital costs are important incentives to attract this type of FDI as China has the world largest labour market. The exchange rate is a preconditioned factor which not only influences the labour and capital cost, but also influences the exporting and importing prices (Froot and Stein, 1991). The empirical research has found that the Chinese currency Renminbi (hereafter, RMB) has been undervalued according to various measure approaches[6]. This study explores whether the inflation or deflation of the currency has significantly influenced FDI.

To catch the geographic effect, the thesis investigates the determinants of FDI sourced from two different regions with similar economic size and FDI volume to China but different geographic location. The United States and Japan are selected as the research sample. First, Japan is located in East Asia and is a close neighbouring country of China. The United States is located geographically far away from China. Secondly, both countries are important economies and are also important FDI source economies for FDI, each having similar FDI amounts to China during the last 30 years. Thirdly, both countries have less Chinese cultural influence than Hong Kong, Taiwan, Singapore. Due to these reasons, the study compares the factor effect of inward FDI from Japan and the USA to capture the geographic influence outside China.

The second question explores the impact of FDI on trade. An important question is whether they have a substitute relationship or a complementary relationship. If the multinational firms access to potential markets through direct investment rather than exporting, there is a substitution relationship between FDI and international trade. FDI are prior to exporting in bypassing the trade obstacle and accessing to the cheaper

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[6] Cline (2005) found that it is under-valued by 43% with respect to the US dollar. Frankel (2004) experimental result indicates that the Renminbi is undervalued by at least 30–35 percent. Zhang (2001) found that undervalue and overvalue of the currency exchange from time to time. However, the cumulative effect of exchange rate reform led to a substantial real depreciation of the Chinese currency since 1981 when the reform was introduced. The undervaluation occurred in 12 of 20 years from 1978 to 1997. Funke and Rahn (2004) applied the behaviour equilibrium exchange rate (BEER) model and the permanent equilibrium exchange rate (PEER) model to measure the value of Chinese exchange rate policy from 1994-2002. They doubted that there is no conclusive evidence to prove the Renminbi is substantially undervalued.

production resource. The complementary relationship between FDI and international may be due to a large volume of inputs/intermediary product transfer between the home countries, producing countries and final market. This may lead to an increase in both exporting and importing volumes. Some important theories have accessed this topic. Markusen (1997) discussed the interaction between the liberalization of international trade and direct investment. The Eclectic theory (Dunning 1980) has declared a location advantage of multinational firms. The advantage emphasis that the production location leads is according to the production cost.

However, in reality, China is not only an important final market, also an important world factory. In 1980s and 1990s, the exporting processing is an important factor. A large volume of products by multinational plants in China exports to the third country together. Inward FDI is supposed to result in an increase in both Chinese import and export. Furthermore, FDI is not only the physical capital movement, which has also, includes the technology transfer. The thesis explores inward and outward FDI influence on the Chinese importing and exporting together concerning the price and technique facts.

The third and fourth research questions focus on the regional level. One economic phenomenon in China is the unequal distribution of FDI between the eastern and western regions. More than 85% of the investment is located in the eastern area. Meanwhile, more than 90% of international trade is conducted in the eastern area.

To estimate the determinants of FDI in China, two subgroup estimations have been undertaken along with the full group GMM estimation. Regional factor has been taken into account, such as transportation facilities and investment environment.

The fourth question explores the impact of trade and FDI on the Chinese economic growth. Industrial organisation theories argue that the impact of technology with respect to in multinational firms and trade on the market competitions (Caves, 1974; Hymer, 1976). Economic growth theories argued that advanced technology, which is one of import factors to increase the profitability, is transferred from one country to another country through FDI and international trade (Grossman and Helpman, 1995).

This study explores the influence of these two channels on the Chinese economic growth.

1.2 The Contributions

This thesis makes three principal contributions to the literature on foreign direct investment in China, by exploring the interrelationships between FDI, international trade and economic growth at both the national and regional level within China, using both time series and panel data methods.

The determinants of inward FDI into China is investigated using time series data, where, using a state-of-the-art macroeconomic model developed by Pain (1990), the key drivers of inward investment are relative wages, market size and net exports, although the source of these FDI flows is also found to be important especially those from Hong Kong, the USA and Japan.

The second contribution is to examine the determinants of inward FDI on the Chinese regions (Chapter 5). Rather than explore the FDI source and recipient countries, this chapter focus on the compitition between FDI recipient regions. The sub-region – the east coast and the west hinterland has been examined. The east coastal has rich resource in the transportation, openness, physical and human capital. The west hinterland area has cheaper labours. However, the result shows that the competition in the sub-regions are determined by it scare resources.

To test the reverse causality hypothesis – that FDI drives trade and not the other way around as postulated in the rest of the thesis– Chapter 5 investigates the plausibility of FDI driving trade. The results show that this model is not substantiated by the data, so the maintained hypothesis that FDI is the dependent variables seems to be appropriate for China.

The third contribution is to examine the effects of FDI on economic growth. In this panel data analysis the impact of FDI on the regions of the country is examined. The results show that economy of the east coastal area in China is motivated by the inward

FDI stock. However, due to the limitation of the catch-up capability, the development of the hinterland in China is driven by the international trade, although the transportation resource in the hinterland is not as rich as ones in the east coast.

1.3 The structure of the thesis

The rest of the study is organised as follows. Chapter 2 has an overview on the background of FDI development in China. Chapter 3 critically reviews the theoretical and empirical work survey on the determinants and impact of FDI, in particular with reference to China. Chapter 4 sets out the econometric methodologies based on the time series and panel dataset. The empirical study consists of chapters 5, 6, 7 and 8. Chapter 5 studies the main determinants of foreign direct investment in China using a time series approach. Chapter 6 explores the influence of FDI on international trade in China using the same time series approach. Chapter 7 investigates the factors affecting FDI distribution within China using GMM approaches. Chapter 8 looks into any influential impact of FDI and international trade on Chinese local economy development. Chapter 9 provides an overall conclusion to the thesis and suggestions for further possible research directions implied by its findings.

Chapter 2 The development and characteristics of Foreign Direct Investment in China

2.1 Introduction

In order to support the further research, this chapter provides a brief review of the main Chinese economic features and the FDI development process. This chapter is arranged as follows. Section 2.2 outlines the important legislative documents and institution which dominated the booming of FDI in China. Section 2.3 reviews the most important FDI source countries. Section 2.4 shows a brief review of the distribution of FDI in China, including FDI stocks, investment types and resources.

2.2 FDI development in China and relevant legislative regulation changes

At the beginning of the economic reform and opening up of the Chinese market, China was facing "double deficits" of physical capital and technology. The experience of other developing countries provides two solutions to fill the capital deficits. The first one is to raise external debt. The second path is to attract FDI into China. Comparing with first path, attracting FDI has more spillover effect on local economic growth. The spillover effects reflect on several aspects. Firstly, FDI not only brings the capital but also the advanced techniques, which is expected to raise the technology level in China. Secondly, the establishment of foreign enterprises in China raises domestic competition, which further stimulates development of domestic firms. Thirdly, launch of foreign enterprise subsidiaries increases domestic employment opportunities. Furthermore, domestic firms benefit from the employee training through the employee flows between the firms. Due to the reasons above, China started attracting FDIs in the late 1970s.

30 years ago, foreign direct investment in China was almost nil. However, after three decades of development, China became the world's largest FDI recipient among the developing countries. The realized FDI stocks in China have reached $562.10 billion (Table 2.1 and Figure 2.1). Reviewing the FDI development of the past 30 years, there are three main development stages.

2.2.1 The period of control: 1979 to mid-1980s

Foreign investment started flowing into China in the late 1970s. During this period, the operation of multinational firms in Chinese was in the trial and error stage. The Chinese National People Congress and State Council established relevant legislative documents and institutions to deal with foreign investment in China.

The documents were mainly designed to position the multinational firms in China and test the effect of FDI on Chinese economy. The attitude of Chinese authorities toward multinational firms is protective and experimental. The main feature of FDI this period is as follows:

- Foreign direct investment in China was dominated by the legislative innovation and institution construction. *Law of the People's Republic of China on Joint-Ventures using Chinese and Foreign Investment*, adopted by the fifth National People Congress in 1979, was the first critical document to legalize the status of multinational enterprises in China. This fundamental law established the legislative framework for the foreign investment enterprises and regulated general activities of joint–venture enterprises such as board creation, initial investment, tax, currency conversion. Following this, a series of institutions and regulations related to inward FDI in China were created. The Commission for the Administration of Foreign Investments was established to take charge of the practical activities of multinationals according to the relative regulations. The Ministry of Foreign Trade and Economic Cooperation, the most important administration department in the system, was established to deal with all the administrative affairs related to the international trade and foreign enterprises. All the projects related to foreign investment had to obtain the approval from this department. *Regulations for the implementation of the law of the People's Republic of China on Joint Ventures using Chinese and Foreign Investment* was promulgated by the State Council provided the guideline for joint venture enterprise in detail[7].

- The operation of these investments in China was under strict control. With no previous experience, the Chinese government was dealing with foreign investment with cautiousness. In particular, the document had strictly limited the influence of foreign investors on board. For instance, the investment was restricted to joint-ventures. The chairman of the board "shall be appointed by the Chinese participant and its vice-chairman by the foreign participant[8]".

- The establishment of Special Economic Zones (SEZs) opens the Chinese economy to the world. To observe the effect of FDI in China, four Special Economic Zones were established in the early 1980s: Shenzhen, Shantou, Zhuhai in Guangdong province and Xiamen in Fujian province. Guangdong and Fujian were the only two provinces which were allowed to manage their own fiscal income and expenditure at that stage. Three cities in Guangdong province are geographically close to Hong Kong, Xiamen is close Taiwan. In the beginning of 1980s, Hong Kong and Taiwan were the main foreign investment source regions of China. By 1988, the entire Hainan province joined the Special Economic Zone. Special Economic Zones in China adopted more flexible policies treatment to attract the foreign investment efficiently.

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[7] The guild includes FDI establishment and registration, organization, ways of contributing investment, board of directors and management office, right to the use of site, planning, purchasing and selling, taxes, foreign exchange control, financial affairs and accounting, staff and workers, trade union, duration, dissolution and liquidation.

[8] Article 34, *Regulations for the implementation of the law of the People's Republic of China on Joint Ventures using Chinese and Foreign Investment*,1983

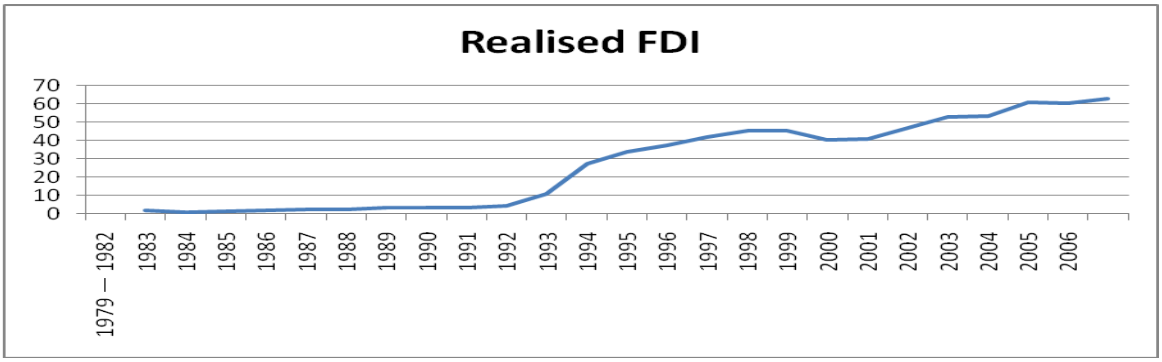
Due to the restriction of the policy, the inflow of investment at this stage is limited. The annual inflow was no more than $10 billion per year (Table 2-1).

Table 2-1 The foreign direct investment projects and inflows in China 1979-2006

Year	Projects	Contracted FDI (bnUS $)	Realised FDI (bn US $)
Total	508941	1095.710	562.105
1979 — 1982	920	4.958	1.769
1983	638	1.917	0.916
1984	2166	2.875	1.419
1985	3073	6.333	1.956
1986	1498	3.330	2.244
1987	2233	3.709	2.314
1988	5945	5.297	3.194
1989	5779	5.600	3.393
1990	7273	6.596	3.487
1991	12978	11.977	4.366
1992	48764	58.124	11.008
1993	83437	111.436	27.515
1994	47549	82.68	33.767
1995	37011	91.282	37.521
1996	24556	73.276	41.726
1997	21001	51.003	45.257
1998	19799	51.202	45.463
1999	16918	41.223	40.319
2000	22347	62.380	40.715
2001	26140	69.195	46.878
2002	34171	82.768	52.743
2003	41081	115.07	53.505
2004	43664	153.479	60.630
2005	44001	189.065	60.324
2006	41473	193.727	63.021

Source: foreign investment report (2007), Statistics Year Book (2007) by China State statistics bureau

Figure 2-1 The realised FDI inflow in China (billion US$) 1979-2006



Source: foreign investment report (2007), Statistics Year Book (2007) by China State statistics bureau

2.2.2 The period of relaxed capital requirement: late 1980s to late 1990s

With the successful experience, the Chinese authrities relaxed the entry requirement for foreign capital in the late 1980s and encouraged the establishment of foreign-funded enterprises that "export their products or have advanced technologies."[9] The features of FDI in this period are as follow:

- A series of special preference policies were authorized to the foreign enterprises in this stage, especially to product export type enterprises[10] and technologically advanced type enterprises[11]. These special preference policies (refer to "super national treatment[12]") includes loan receiving, remittance of profit, income tax, export license, import exam exemption and import license, which located the foreign owned enterprise in a more competitive position than the Chinese domestic firms in both financial and nonfinancial operations. A debate was raised on these special treatments as it causes a further the abusing of the preferential treatment and cheaper Chinese labours by multinational threatened markets of the domestic firm. Although the impact of super national treatment is still under debate in China, the release of relevant restrictions and the implementation of special preference policies brought an influx of investment to China in the 1990s.

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[9] Article 3. *Law of the People's Republic of China on Enterprises Operated Exclusively with Foreign Capital*,1986

[10] *It is defined as* "Production-type enterprises whose products are mainly export, which have a foreign exchange surplus after deducting from their total annual foreign exchange revenues the annual foreign expenditures incurred in production and operation and the foreign exchange needed for the remittance abroad of the profits earned by foreign investors" by *Provisions on the Encouragement of Foreign Investment*,1986

[11] *It is defined as* "Production-type enterprises possessing advanced technology supplied by foreign investors which are engaged in developing new products, and upgrading and replacing products in order to increase foreign exchange generated by exports or for import substitution" *Provisions on the Encouragement of Foreign Investment*,1986

[12] Wei Wang, 2010, *Super-National Treatment: A Misconception or a Creation with Chinese Characteristics?* Law China 2010, 5(3): 376–396 DOI 10.1007/s11463-010-0103-3

- The inflows maintained a positive annual increase till the 1997 Asian Financial Crisis (Figure 2-1). During 1992-1994, there was a higher surge of FDI inflow.

- The investment pattern joint-venture is classified as Equity Joint Venture and Contractual Joint Venture [13] in the stage. A more flexible investment pattern, Wholly Foreign owned Enterprise[14] was developed.

- The establishment OCCs, ETDZs, HTDZs and FRZs attract the foreign investment located in the coastal area of China.

Open Coastal Cities (OCCs)

To attract more foreign investment to China, 14 coastal cities were open to overseas investment in 1984, namely Dalian, Qinhuangdao, Tianjin, Yantai, Qingdao, Lianyungang, Nantong, Shanghai, Ningbo, Wenzhou, Fuzhou, Guangzhou, Zhanjiang and Beihai. These Open Coastal Cities were initially developed economic areas with well-established industrial backgrounds, high technology and highly skilled labour, a strong educational environment, rich foreign trade experience and important regional economy position.

The foreign investors in OCCs benefited from various policies. The exports from OCCs did not involve quotas; enterprise in these cities had special treatment in tariffs, import industrial and commercial tax, corporate income tax on profit and production or tax exemption treatment. The joint venture, cooperative and foreign-owned enterprises in the cities were allowed to increase the use of foreign exchange quotas and foreign exchange loans.

The economic cooperation between OCCs in the coastal belt stimulated the economic development of neighbouring regions. Spillover effects cover the whole geographic area, which led to several geographic open economic groups. The most important open economic area are Yangtze River Delta, Pearl River Delta, Xiamen-Zhangzhou-Quanzhou Triangle in south Fujian, Shandong Peninsula, Liaodong Peninsula

[13] the *Sino-Foreign Contractual Joint Venture Law of the People's Republic of China* ,1988

[14] *Wholly-Foreign-Funded Enterprise Law of the People's Republic of China*,1986

(Liaoning Province), Hebei and Guangxi. In June 1990, Pudong New Area in Shanghai was open to overseas investment with additional cities along the Yangtze River valley. It comes into another foreign investment belt following Yangtze River. Shanghai Pudong New Area acts as its "dragon head."

ETDZs, HTDZs and FRZs

Special Economic Zones and Open Coastal Cities were established by the policy supported by the central authorities through concession treatment. According to these successful experiences, various regional development zones were established by to attract the foreign investment since 1990s. The most common forms are ETDZs, HTDZs and FRZs.

The establishment of Economic and Technological Development Zones (ETDZs) aimed to promote the local economy. Up till 2010, 32 state level ETDZs have been established. Different to SEZs, ETDZs are special areas within a city created by the economy concussion treatment for foreign investors rather than the entire city as an economic zone. The special economy treatment is according to the regulations by local government. Therefore, the foreign funded enterprise normally could not declare the country level benefit on the tariff exemption, important license.

Same as ETDZs, New and High-Tech Industrial Development Zones (HTDZs) were promoted by local government. There are 53 industrial development zones in China. They aim to attract the foreign investment with high technological advantage. HTDZs have more tax benefit than ETDZs.

The Free Trade Zones aim to facilitate exporting activities of multinational firms. There are 15 Free-Trade Zones (FTZs) in China up till now. The main functions of the zones are "bonded warehousing, export processing and entrepot trade”. The enterprises in the zone benefit from "free card, tax-free, bonded" policy. For instance, according to *the Provisions Establishment of Yangshan Bonded Port Area* by State Council, domestic goods in the zone are treated as exports and subjected to tax rebate; goods transactions between the firms in the zone do not levy value-added tax and consumption tax.

2.2.3 The period of guide: the late 1990s onwards

The implementation of super national treatment provided a competitive advantage to foreign funded enterprises in the Chinese market. However, the abuse of these treatments to low quality investment compressed the developing opportunities of domestic firms. Since late 1990s the Chinese government adjusted the policy to foreign investment. The adjustment emphasized the project management and the support for high technique projects.

The feature of foreign direct investment in this period is cautious. The policies were mainly designed to encourage New-High technology project and limited the abuse production resource ones. To raise the efficiency in project management, the administration system classified the foreign investment projects into four categories: encouraged, permitted, restricted and prohibited projects. [15] The project with new agricultural technology, new high technology and the demands of the international market are encouraged by the policy. The new regulation intends to select the high quality FDI with new techniques and lead foreign direct investment return to its initial expectation, which aims to promote the development of the Chinese economy.

To summarise, the policy development of FDI in China aims to attract two types of foreign funded enterprises, the new and high technique enterprises and the exported related enterprises. These two types of firms are expected to provide the solutions to Chinese physical capital and technique shortage.

However, the development of exported related and high technique enterprises is not only the accumulation of FDI. The spillover effects influenced various aspects of the Chinese economy, especially with respect to international trade and economic development. The thesis investigates these interrelationships in Chapter 5-8.

[15] *Interim Provisions on Guiding Foreign Investment Direction, 1995 (initial), 2002(adjustment)*

2.3 The main FDI resource regions

According to the statistics at the end of 2006, the 10 largest inward FDI source areas were: Hong Kong, Japan, Virgin Islands, United States, Taiwan, South Korea, Singapore, United Kingdom, Germany and the Cayman Islands. There are four important characteristics of these source regions.

- The investment is highly concentrated in few important economies. The investments from these top 10 source regions take 86.93% of total inward FDI stock. In particular, Hong Kong is the most important FDI source region, which takes more than 40% of total foreign investment in China (Table 2-2).

- Half of the resource regions are geographically close to China. Two are free port islands, the five main source countries are located in East or Southeast Asia, which is geographically close to China. The other three are geographically far from China. Due to this phenomenon, in addition to the research on aggregate FDI in China, chapter 5 plans to compare the factor effect of FDI from close neighbour-Japan and USA which are geographically away from China.

- The majority of the investment are from other Greater China regions. Hong Kong, Taiwan, and Singapore have similar cultural backgrounds, dialects, economic relations and family links with mainland China. Japan and the United States are the main source regions after Hong Kong. These regions are less influenced by Chinese cultural background, which more directly reflect the impact of the economic factors on inward FDI.

- The source countries are also the main trade partner of China. Hong Kong, Taiwan, Singapore, U.S. Japan, South Korea, U.K. and Germany, which are listed in the top 10 FDI source countries are also listed in the top 10 most important Chinese export destinations (Table 2-3), although there is some difference with the import supplier list. The interrelationship is further explored in the empirical Chapter 6.

Table 2-2 Inward FDI stock and share from top 10 FDI source regions 2007

Rank	*Regions*	*FDI stock ($billion)*	*Share (%)*
1	Hong Kong	279.755	40.81
2	Japan	57.973	8.46
3	Virgin Islands	57.164	8.34
4	United States	53.955	7.87
5	Taiwan	43.893	6.40
6	South Korea	34.999	5.11
7	Singapore	30.004	4.38
8	United Kingdom	13.922	2.03
9	Germany	13.418	1.96
10	Cayman Islands	10.755	1.57
	Total top 10 economies	595.838	86.93

Source: foreign investment report (2007), Statistics Year Book (2007) by China State statistics bureau

Table 2-3 The 10 most important trade partner of China 2010($ billions)

	China's Top Trade Partners		*China's Top Export Destinations*		*China's Top Import Suppliers*	
Rank	*Country/region*	*Volume*	*Country/region*	*Volume*	*Country/region*	*Volume*
1	United States	385.3	United States	283.3	Japan	176.7
2	Japan	297.8	Hong Kong	218.3	South Korea	138.4
3	Hong Kong	230.6	Japan	121.1	Taiwan	115.7
4	South Korea	207.2	South Korea	68.8	United States	102.0
5	Taiwan	145.4	Germany	68.0	Germany	74.3
6	Germany	142.4	The Netherlands	49.7	Australia	60.9
7	Australia	88.1	India	40.9	Malaysia	50.4
8	Malaysia	74.2	United Kingdom	38.8	Brazil	38.1
9	Brazil	62.5	Singapore	32.3	Thailand	33.2
10	India	61.8	Italy	31.1	Saudi Arabia	32.8

Source: PRC General Administration of Customs, China's Customs Statistics

2.4 The FDI distribution

FDI in China is not equally distributed. The investments in China are clustered in the eastern regions[16]. Up till the end of 2006, 83% of total foreign investment projects and 86.85% of the total FDI stocks located in the eastern region (Table 2-4). The

[16] The east coastal area usually reference to 11 provinces or special cities. From North to South, the area includes Liaoning, Heibei, Beijing, Tianjin, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong and Hainan.

investments in the central and western regions are small[17]. This section compares sub-area FDI in three aspects: FDI source countries, investment sector and investment type.

Main source regions

The main source regions in three sub-areas are similar. The main important FDI source regions are Hong Kong, Japan, the United States, ASEAN and the EU countries.

There are two phenomena of notification. First, the top 15 source regions takes more than 90% of total investment in all three sub-groups (Table 2-5). The most important source region is Hong Kong, which takes almost 40% of the investment. Japan, the United States are the second and the third most important source regions in all three sub-areas. This is same across the nation.

Second, the investment from Asian countries has been inclined to locate in the eastern China, while the investment from Europe and America are more evenly distributed in three sub-geographic groups. Compared with the central and western areas, the realized FDI stock sourced from Japan takes 8.92% of total investment in the eastern region, but only 4.92% and 4.99% in the central and western region. The realized FDI from South Korea is 5.25% in the coastal region and 2.77% and 1.14% in the central and western area. Investment from Hong Kong and Taiwan are the same (Table 2-6).

The reason for the investment from East Asia has a higher rate in the coastal area is due to the geographic location advantage. FDI from Japan and South Korea bear less transportation cost than FDI from the US and the EU countries. The geographic advantages build the precondition export orientated FDI for Japan and South Korea. The advanced transportation resource in eastern coast attracts more export-oriented FDI than hinterland.

[17] The central areas include 8 provinces, which are Hubei, Hunan, Jiangxi, Henan, Heilongjiang, Anhui, Jilin and Shanxi. The west area includes 12 provinces, which are Guangxi, Sichuan, Shaanxi , Chongqing, Inner Mongolia, Yunnan, Gansu, Guizhou, Xinjiang, Ningxia, Qinghai and Tibet

Main investment sector

Manufactures is the most important sector for foreign investment in all three regions. However, the weight of manufacturing in the total investment is 67.23% in the east, 55.72% and 49.46% in the central and the western area. The weight in the eastern area is much higher than the other regions.

In general, the wage level in the eastern area is higher than hinterland. The hinterland has more labour resource than the eastern area. Manufacture, as a labour intensive industry, replies on the wage competition. For efficient-seeking type FDI, the hinterland is a more attractive investment location. However, it is not same as the investment reality. This raises the hypothesis whether there are other factors which attract FDI in the eastern area. This question is discussed in chapter 7.

Investment pattern

Joint-venture, Sino-Foreign cooperation, and wholly foreign owned enterprises are three most popular foreign investment patterns in China. Wholly foreign owned enterprises are the most important investment pattern in the east China. It takes 52.72% of the total investment in the area (Table 2-7). Joint–Venture, a more domestic economy involved type of investment, is the most important pattern in the central and western area. 51.73% of the investment in the central area and 54.02% of the investment in the western area take this pattern of investment.

The investment pattern selection reflects the market maturity and the investment environment. In the beginning of an open door policy, the joint-venture enterpreses were only pattern permitted in the Chinese market. Wholly foreign owned enterprises were introduced in the late 1980s. With the liberalization of investment policy in China, wholly foreign investment enterprises grew quickly in the eastern region. However, it did not happen in the central and the western areas. The market in the eastern China are more mature than the western and the central areas.

Table 2-4 project number and FDI stock in the eastern, the central and the western regions

	Project		Contracted FDI (bn$)		Realized FDI (bn$)	
Region	No.	rate%	FDI stock	rate%	FDI stock	rate%
National wide	584415	100	1479.4	100	685.4459	100
east	493482	83.02	1251.343	86.61	595.293	86.85
central	54031	10.77	120.0759	8.12	60.21813	8.79
west	36932	6.21	77.98124	5.27	29.93483	4.37

Source: foreign investment report (2006)

Figure 2-2 the administrative division of China (unit billion US$)

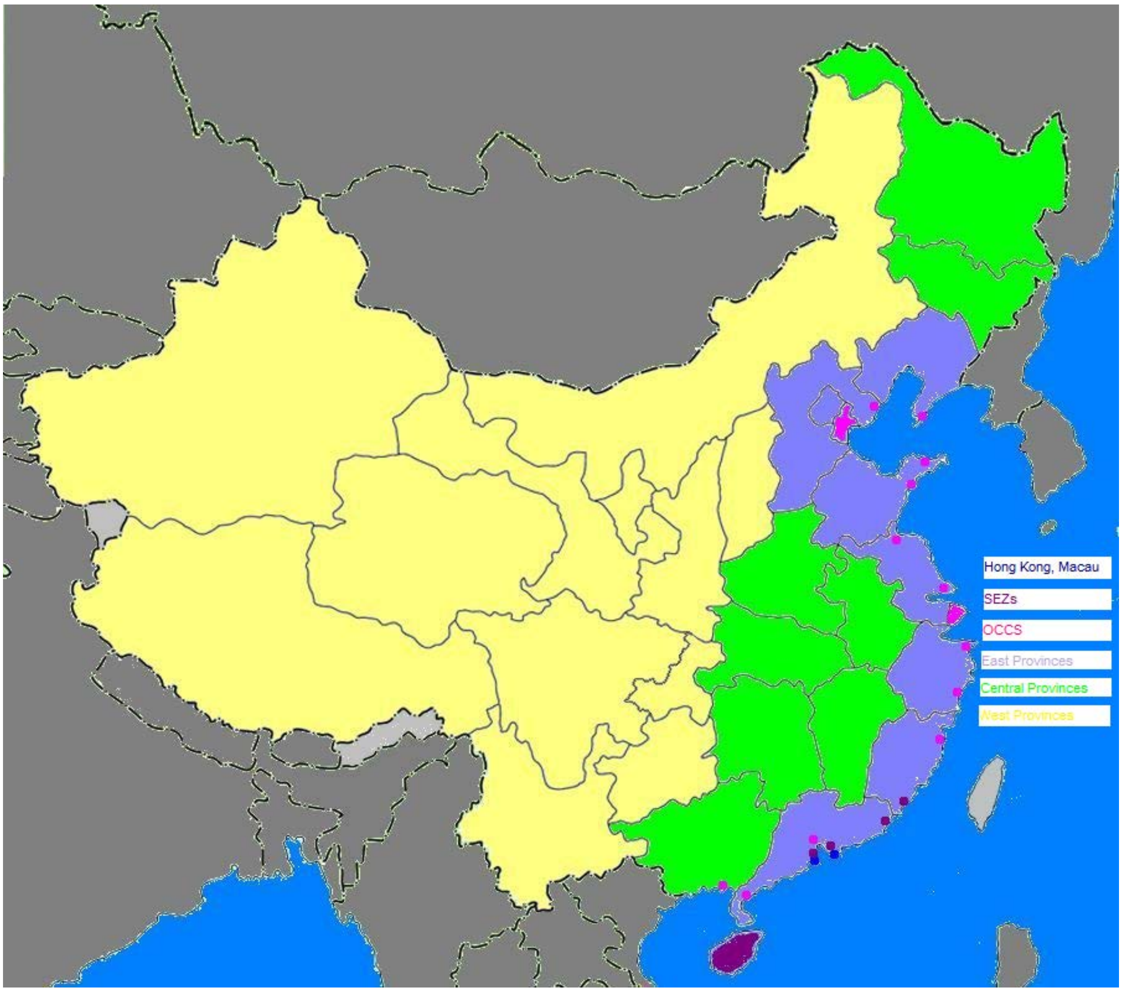

Table 2-5 FDI stock from the source country's distribution 1982－2005 (billion US$)

	East			*Central*			*West*		
Rank	Source Region	Realized FDI stock	rate		Realized FDI stock	rate	rate	Realized FDI stock	rate
	World	568997.50	100	World	38053.50	100	World	15374.00	100
1	Hong Kong	238066.30	41.84	Hong Kong	15585.20	40.96	Hong Kong	5871.00	38.19
2	Japan	50737.19	8.92	Virgin Islands	2907.25	7.64	Virgin Islands	1745.80	11.36
3	United States	46728.57	8.21	United States	2888.38	7.59	United States	1473.20	9.58
4	Virgin Islands	41263.49	7.25	Taiwan	2303.00	6.05	Japan	767.06	4.99
5	Taiwan	38720.46	6.81	Japan	1871.14	4.92	Taiwan	733.26	4.77
6	South Korea	29871.98	5.25	Singapore	1788.81	4.7	Singapore	644.90	4.19
7	Singapore	25309.85	4.45	France	1285.66	3.38	France	626.44	4.07
8	United Kingdom	11751.68	2.07	Germany	1071.09	2.81	United Kingdom	514.57	3.35
9	Germany	10191.89	1.79	South Korea	1055.96	2.77	Mauritius	379.54	2.47
10	Cayman Islands	8062.28	1.42	United Kingdom	929.29	2.44	Cayman Islands	255.69	1.66
11	Netherlands	6243.16	1.10	Investment company	789.54	2.07	Australia	239.96	1.56
12	Macau	5651.64	0.99	Netherlands	577.67	1.52	Samoa	215.50	1.40
13	France	5507.36	0.97	Canada	547.55	1.44	Germany	176.18	1.15
14	Samoa	5336.62	0.94	Macau	511.91	1.35	South Korea	175.76	1.14
15	Investment Institution	4300.24	0.76	Malaysia	380.93	1.00	Macau	173.12	1.13
	Sum of 15 regions	527742.70	92.75	Sum of 15 regions	34496.50	90.65	Sum of 15 regions	13992.00	91.01

Source: foreign investment report (2006)

Table 2-6 FDI stock weight of main resource countries in three regions 1982-2005

Asian				America and Europe			
Source Region	East	Central	West	Source Region	East	Central	West
World	100	100	100	World	100	100	100
Hong Kong	41.84	40.96	38.19	United States	8.21	7.59	9.58
Japan	8.92	4.92	4.99	United Kingdom	2.07	2.44	3.35
Taiwan	6.81	6.05	4.77	Germany	1.79	2.81	1.15
South Korea	5.25	2.77	1.14	France	0.97	3.38	4.07
Singapore	4.45	4.7	4.19				
Macau	0.99	1.35	1.13				

Source: foreign investment report (2006)

Table 2-7 1982-2005 FDI stock investment patterns

pattern	East		central		west	
	US$ million	weigh	US$ million	weight	US$ million	weigh
total	382427.42	100	42767.91	100	17881.60	100
Joint	138761.90	36.28	22121.98	51.73	9659.24	54.02
Sino-foreign	37943.41	9.92	4269.15	9.98	2385.53	13.34
Wholly	201634.27	52.72	16197.87	37.87	5611.02	31.38
Sino-foreign	3996.16	1.04	154.71	0.36	225.81	1.26
rest	91.68	0.02	24.20	0.06		

Source: foreign investment report (2006)

Table 2-8 sector distribution of realized FDI

sector	*east*		*central*		*west*	
	US$ bn	*weight%*	*US$ bn*	*Weight%*	*US$ bn*	*Weight%*
Total	392.41	100.00	38.05	100.00	1.54	100.00
Agriculture, forestry, animal husbandry & fishing	5.86	1.49	1.09	2.87	0.04	2.88
Mining and Quarrying	4.32	1.10	0.58	1.53	0.04	2.49
Manufacturing	263.99	67.27	21.20	55.72	0.76	49.46
Electric Power, Gas and Water Production and Supply	14.01	3.57	3.23	8.48	0.14	8.81
Construction	6.60	1.68	1.59	4.18	0.05	3.42
Transport, Storage, Post and Telecommunication services	10.60	2.70	0.73	1.92	0.03	1.99
Information Transmission, Computer Services and Software	1.82	0.46	0.08	0.22	0.00	0.18
Wholesale and Retail Trades	8.67	2.21	0.42	1.09	0.03	2.03
Hotels and Catering Services	1.07	0.27	0.20	0.53	0.01	0.87
Financial Intermediation	0.99	0.25	0.06	0.17	0.00	0.02
Real Estate	41.30	10.53	5.40	14.19	0.25	16.44
Leasing and Business Services	14.46	3.69	0.73	1.93	0.03	1.82
Scientific Research, Technical Service and Geologic Prospecting	1.24	0.32	0.16	0.43	0.01	0.59
Management of Water Conservancy, Public Facilities Environment and	0.22	0.06	0.11	0.30	0.00	0.20
Services to Households and Other Services	15.43	3.93	2.19	6.52	0.12	7.71
Education	0.31	0.08	0.10	0.26	0.00	0.23
Health, Social Security and Social Welfare	0.89	0.23	0.06	0.17	0.01	0.63
Culture, Sports and Entertainment	0.62	0.16	0.11	0.28	0.00	0.21
Public Management and Social Organizations	0.01	0.00				

Source: foreign investment report (2006)

2.5 International trade of China

There are three important features of the Chinese international trade. Firstly, manufacture products are the most important items in the Chinese international trade. Since the 1980s, the Chinese export of manufacture products has experienced a rapid growth. In 2008, the manufactured products take 94% of total Chinese export goods (Table 2-9). The China imports have increased at the same rate. The import of manufacture is 68% of international trade in 2008, which is less the share in export.

The share of technology based products has increased. Textiles, apparel, footwear toys, telecommunications and electrical equipment, these labour intensive industries, take a large proportion of total Chinese exports in the 1980s (Table 2-10). Since 2000, machinery and transportation has become the most important sector for international exports. Meanwhile, the imports cluster in the machinery, transportation equipment and high technology equipment products, these more technology based sectors (Table 2-11).

Secondly, processing export is an important component of total Chinese trade (Table 2-12). In the beginning of the 1980, ordinary trade was the most important part of international trade in China. However, with the Chinese trade liberalization reform and the influx of foreign direct investment, processing trade growth fast. The export value of processing trade is even larger than ordinary trade in the period of 1996-2005. In the late 2000s, although the exports and import value of processing trade still increase, the share of processing trade in total international trade decrease, which is accompanied with the Chinese FDI policy changes (Section 2.2.3).

The statistic data indicate that FDI, in particular, export-oriented FDI raise the processing trade, which further raise total Chinese international trade, as processing trade is an important part of Chinese international trade.

Thirdly, the trade of multinational subsidiaries in China takes more than 50% of total Chinese trade (Table 2-13). The trade value of foreign funded enterprises, which takes 34.37% of total international trade of enterprises in China in 1993. However, in 2007 this share increases to 57.74%. Similarly, the imports of foreign enterprises, taking 40% of total Chinese imports in 1993, have increased to 59% of total imports.

Does foreign direct investment promote Chinese imports and exports? This question cannot be answered by direct statistic data, although trade volume of multinational subsidiaries composed an important share of the Chinese exports and imports. The growth rate of FDI inflows and international trade does not exhibit a strong correlation (Figure 2-3, Table 2-14). They move in opposite a direction, which ironically indicates a substitute relationship. The empirical chapter 6 plans to have a discussion on this question with econometric approach.

Table 2-9 The Chinese trade value by Category of Commodities (unit: billion US$)

	Exports				Imports			
	Total	*Primary*	*Manufactured*	*Manufactured Share %*	*Total*	*Primary*	*Manufactured*	*Manufactured Share %*
1980	18.12	9.11	9.01	49.70	20.02	6.96	13.06	65.23
1985	27.35	13.83	13.52	49.44	42.25	5.29	36.96	87.48
1990	62.09	15.89	46.21	74.41	53.35	9.85	43.49	81.53
1991	71.91	16.15	55.70	77.46	63.79	10.83	52.96	83.02
1992	84.94	17.00	67.94	79.98	80.59	13.26	67.33	83.55
1993	91.74	16.67	75.08	81.83	103.96	14.21	89.75	86.33
1994	121.01	19.71	101.30	83.71	115.61	16.49	99.13	85.74
1995	148.78	21.49	127.30	85.56	132.08	24.42	107.67	81.51
1996	151.05	21.93	129.12	85.48	138.83	25.44	113.39	81.68
1997	182.79	23.95	158.84	86.90	142.37	28.62	113.75	79.90
1998	183.71	20.49	163.22	88.85	140.24	22.95	117.29	83.64
1999	194.93	19.94	174.99	89.77	165.70	26.85	138.85	83.80
2000	249.20	25.46	223.74	89.78	225.09	46.74	178.36	79.24
2001	266.10	26.34	239.76	90.10	243.55	45.74	197.81	81.22
2002	325.60	28.54	297.06	91.23	295.17	49.27	245.90	83.31
2003	438.23	34.81	403.42	92.06	412.76	72.76	340.00	82.37
2004	593.33	40.55	552.78	93.17	561.23	117.27	443.96	79.11
2005	761.95	49.04	712.92	93.56	659.95	147.71	512.24	77.62
2006	968.94	52.92	916.02	94.54	791.46	187.13	604.33	76.36
2007	1217.78	61.51	1156.27	94.95	955.95	243.09	712.87	74.57
2008	1430.69	77.96	1352.74	94.55	1132.56	362.40	770.17	68.00

Data source: Chinese statistics year book (2009)

Table 2-10 Chinese exports value by category of manufactory goods (billionUS$)

	Manufactured Goods	*Chemicals and Related Products*	*Light Textile Industrial Products, Rubber Products, Minerals and Metallurgical Products*	*Machinery and Transport Equipment*	*Miscellaneous Products*	*Products Not Otherwise Classified*
1980	9.01	1.12	4.00	0.84	2.84	0.21
1985	13.52	1.36	4.49	0.77	3.49	3.41
1990	46.21	3.73	12.58	5.59	12.69	11.63
1991	55.70	3.82	14.46	7.15	16.62	13.66
1992	67.94	4.35	16.14	13.22	34.23	
1993	75.08	4.62	16.39	15.28	38.78	
1994	101.30	6.24	23.22	21.90	49.94	0.01
1995	127.30	9.09	32.24	31.41	54.55	0.01
1996	129.12	8.88	28.50	35.31	56.42	0.01
1997	158.84	10.23	34.43	43.71	70.47	0.00
1998	163.22	10.32	32.48	50.22	70.20	0.01
1999	174.99	10.37	33.26	58.84	72.51	0.01
2000	223.74	12.10	42.55	82.60	86.28	0.22
2001	239.76	13.35	43.81	94.90	87.11	0.58
2002	297.06	15.33	52.96	126.98	101.15	0.65
2003	403.42	19.58	69.02	187.77	126.09	0.96
2004	552.78	26.36	100.65	268.26	156.40	1.11
2005	712.92	35.77	129.12	352.23	194.18	1.61
2006	916.02	44.53	174.82	456.34	238.01	2.32
2007	1156.27	60.32	219.88	577.05	296.84	2.18
2008	1352.74	79.35	262.39	673.33	335.96	1.71

Data source: Chinese statistics year book (2009)

Table 2-11 Chinese imports Value by Category of manufactory goods (billion US$)

	Manufactured Goods	*Chemicals and Related Products*	*Light Textile Industrial Products, Rubber Products, Minerals and Metallurgical Products*	*Machinery and Transport Equipment*	*Miscellaneous Products*	*Products Not Otherwise Classified*
1980	13.06	2.91	4.15	5.12	0.54	0.33
1985	36.96	4.47	11.90	16.24	1.90	2.46
1990	43.49	6.65	8.91	16.85	2.10	8.99
1991	52.96	9.28	10.49	19.60	2.44	11.15
1992	67.33	11.16	19.27	31.31	5.59	
1993	89.75	9.70	28.53	45.02	6.50	
1994	99.13	12.13	28.08	51.47	6.77	0.68
1995	107.67	17.30	28.77	52.64	8.26	0.69
1996	113.39	18.11	31.39	54.76	8.49	0.65
1997	113.75	19.30	32.22	52.77	8.55	0.91
1998	117.29	20.16	31.08	56.85	8.46	0.75
1999	138.85	24.03	34.32	69.45	9.70	1.35
2000	178.36	30.21	41.81	91.93	12.75	1.65
2001	197.81	32.10	41.94	107.02	15.08	1.68
2002	245.90	39.04	48.49	137.01	19.80	1.56
2003	340.00	48.98	63.90	192.83	33.01	1.28
2004	443.96	65.47	73.99	252.83	50.14	1.53
2005	512.24	77.73	81.16	290.48	60.86	2.01
2006	604.33	87.05	86.92	357.02	71.31	2.03
2007	712.87	107.55	102.88	412.46	87.51	2.47
2008	770.17	119.19	107.17	441.77	97.64	4.41

Data source: Chinese statistics year book (2009)

Table 2-12 Total Value of Imports and Exports (unit 100 Billion US$)

Year	*Ordinary Trade*		*Processing Trade*		*Others*		*Share of processing trade in total trade%*	
	Exports	*Imports*	*Exports*	*Imports*	*Exports*	*Imports*	*exports*	*imports*
1981-1985	110.10	119.14	9.37	11.47	0.58	1.75	**7.81**	**8.67**
1981	20.80	20.37	1.13	1.50	0.08	0.14	5.14	6.83
1982	22.25	18.89	0.05	0.28	0.02	0.14	0.24	1.43
1983	20.16	18.77	1.94	2.27	0.13	0.35	8.74	10.62
1984	23.16	23.85	2.93	3.15	0.05	0.41	11.21	11.48
1985	23.73	37.27	3.32	4.27	0.30	0.70	12.12	10.12
1986-1990	154.37	161.00	73.88	67.92	4.28	24.95	**31.77**	**26.76**
1986	25.10	35.21	5.62	6.70	0.23	0.99	18.16	15.62
1987	29.64	28.77	8.99	10.19	0.80	4.25	22.80	23.58
1988	32.62	35.20	14.06	15.11	0.84	4.96	29.59	27.33
1989	31.55	35.61	19.79	17.16	1.20	6.36	37.66	29.02
1990	35.46	26.20	25.42	18.76	1.21	8.39	40.94	35.16
1991-1995	257.93	180.10	246.98	198.88	13.48	117.05	**47.64**	**40.09**
1991	38.12	29.54	32.43	25.03	1.36	9.22	45.10	39.24
1992	43.68	33.62	39.62	31.54	1.64	15.43	46.64	39.14
1993	43.20	38.05	44.25	36.37	4.30	29.54	48.23	34.98
1994	61.56	35.52	56.98	47.57	2.47	32.52	47.09	41.15
1995	71.37	43.37	73.70	58.37	3.71	30.34	49.54	44.19
1996-2000	399.37	289.19	536.92	367.21	25.40	155.83	**55.83**	**45.21**
1996	62.84	39.36	84.33	62.27	3.88	37.20	55.83	44.85
1997	77.97	39.03	99.60	70.21	5.21	33.13	54.49	49.31
1998	74.24	43.68	104.45	68.60	5.02	27.96	56.86	48.92
1999	79.14	67.04	110.88	73.58	4.91	25.08	56.88	44.40
2000	105.18	100.08	137.65	92.56	6.37	32.46	55.24	41.12
2001-2005	988.77	958.00	1313.65	874.79	82.78	339.80	**55.08**	**40.26**
2001	111.88	113.46	147.43	93.97	6.78	36.12	55.41	38.58
2002	136.19	129.11	179.93	122.20	9.48	43.86	55.26	41.40
2003	182.03	187.65	241.85	162.90	14.35	62.12	55.19	39.48
2004	243.61	248.15	327.97	221.69	21.74	91.39	55.28	39.50
2005	315.06	279.63	416.47	274.01	30.42	106.31	54.66	41.52
2006-2008	1617.52	1333.78	1803.03	1068.33	196.86	477.87	**49.84**	**37.09**
2006	416.20	333.07	510.36	321.47	42.38	136.92	52.67	40.62
2007	538.46	428.61	617.56	368.48	61.76	158.86	50.71	38.55
2008	662.86	572.09	675.11	378.38	92.72	182.09	47.19	33.41

Data source: Chinese statistics year book (2009)

Table 2-13 Chinese trade value and foreign invested enterprises (FIEs) trade value in China (billion US$)

	Total trade	*Export from China*	*Import to China*	*Trade by FIEs*	*Exports by FIEs*	*imports by FIEs*	*Share of FIEs trade in total trade (%)*	*Share of FIEs exports in total exports (%)*	*Share of FIEs imports in total imports (%)*
1993	195.70	91.74	103.96	67.07	25.24	41.83	34.27	27.51	40.24
1994	236.62	121.01	115.61	87.65	34.71	52.93	37.04	28.69	45.79
1995	280.86	148.78	132.08	109.82	46.88	62.94	39.10	31.51	47.65
1996	289.88	151.05	138.83	137.11	61.51	75.60	47.30	40.72	54.46
1997	325.16	182.79	142.37	152.62	74.90	77.72	46.94	40.98	54.59
1998	323.95	183.71	140.24	157.68	80.96	76.72	48.67	44.07	54.71
1999	360.63	194.93	165.70	174.51	88.63	85.88	48.39	45.47	51.83
2000	474.30	249.20	225.09	236.71	119.44	117.27	49.91	47.93	52.10
2001	509.65	266.10	243.55	259.10	133.24	125.86	50.84	50.07	51.68
2002	620.77	325.60	295.17	330.24	169.99	160.25	53.20	52.21	54.29
2003	850.99	438.23	412.76	472.17	240.31	231.86	55.48	54.84	56.17
2004	1154.56	593.33	561.23	663.04	338.59	324.45	57.43	57.07	57.81
2005	1421.91	761.95	659.95	831.64	444.18	387.46	58.49	58.30	58.71
2006	1760.40	968.94	791.46	1036.27	563.78	472.49	58.87	58.19	59.70
2007	2173.73	1217.78	955.95	1255.16	695.37	559.79	57.74	57.10	58.56
2008	2563.26	1430.69	1132.56	1409.92	790.49	619.43	55.01	55.25	54.69

Data source: Chinese statistics year book (1996-2009)

Figure 2-3 growth rate of nominal FDI inflow and international trade of China

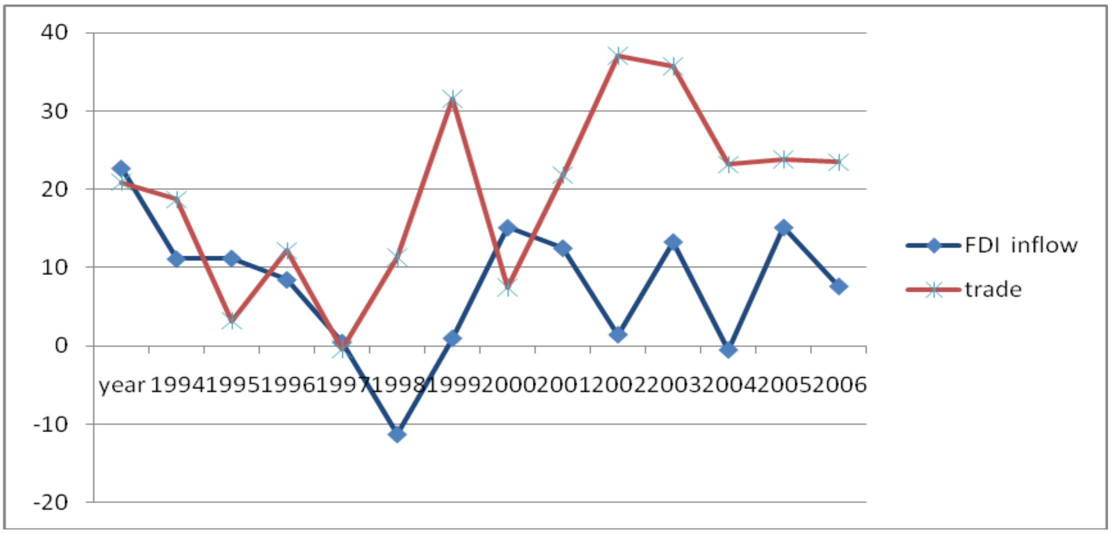

Table 2-14 the growth rate of nominal FDI inflow and trade

Panel A: nominal value (BillionvUS$)					
year	*FDI inflow*	*FDI stock*	*trade*	*export*	*imports*
1993	27.52	63.58	195.70	91.74	103.96
1994	33.77	97.35	236.62	121.01	115.61
1995	37.52	134.87	280.86	148.78	132.08
1996	41.73	176.60	289.88	151.05	138.83
1997	45.26	221.85	325.16	182.79	142.37
1998	45.46	267.32	323.95	183.71	140.24
1999	40.32	307.63	360.63	194.93	165.70
2000	40.72	348.35	474.29	249.20	225.09
2001	46.88	395.23	509.65	266.10	243.55
2002	52.74	447.97	620.77	325.60	295.17
2003	53.51	501.48	850.99	438.23	412.76
2004	60.63	562.11	1154.55	593.32	561.23
2005	60.33	622.43	1421.91	761.95	659.95
2006	69.47	691.90	1760.40	968.94	791.46
2007	74.77	760.22	2173.73	1217.78	955.95
Panel B: growth rate %					
year	*FDI inflow*	*FDI stock*	*trade*	*export*	*imports*
1994	22.72	53.11	20.91	31.91	11.21
1995	11.12	38.54	18.70	22.95	14.25
1996	11.21	30.94	3.21	1.53	5.11
1997	8.46	25.63	12.17	21.01	2.55
1998	0.46	20.49	-0.37	0.50	-1.50
1999	-11.31	15.08	11.32	6.11	18.15
2000	0.98	13.23	31.52	27.84	35.84
2001	15.14	13.46	7.46	6.78	8.20
2002	12.51	13.34	21.80	22.36	21.19
2003	1.44	11.94	37.09	34.59	39.84
2004	13.32	12.09	35.67	35.39	35.97
2005	-0.50	10.73	23.16	28.42	17.59
2006	15.16	11.16	23.81	27.17	19.93
2007	7.63	9.87	23.48	25.68	20.78

Data source: Chinese statistics year book (1996-2009)

2.6 Chinese Regions and economic growth

Accompanied with economic reforms, the Chinese economy has kept a continuous growth rate in gross domestic product for more than 30 years. The growth rates of nominal Chinese GDP, real Chinese GDP series are similar. During the period of 1993-1995, the growth rate more than 20% per year (Table 2-15).

Figure 2-4 Chinese GDP (billion Yuan)

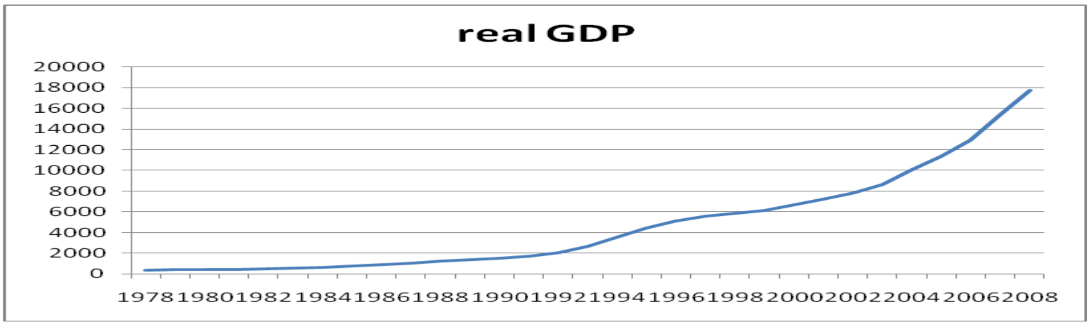

Figure 2-5 Growth rate of real GDP

Figure 2-6 real Chinese GDP

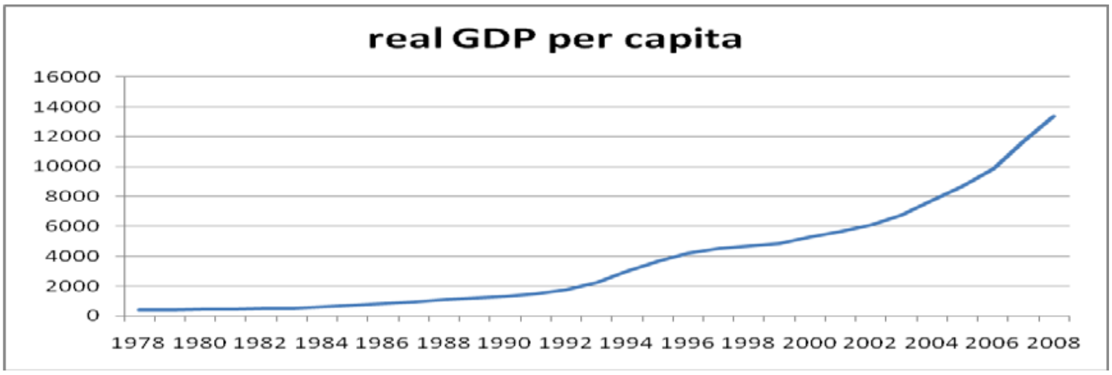

Figure 2-7 the growth rate of real GDP per year

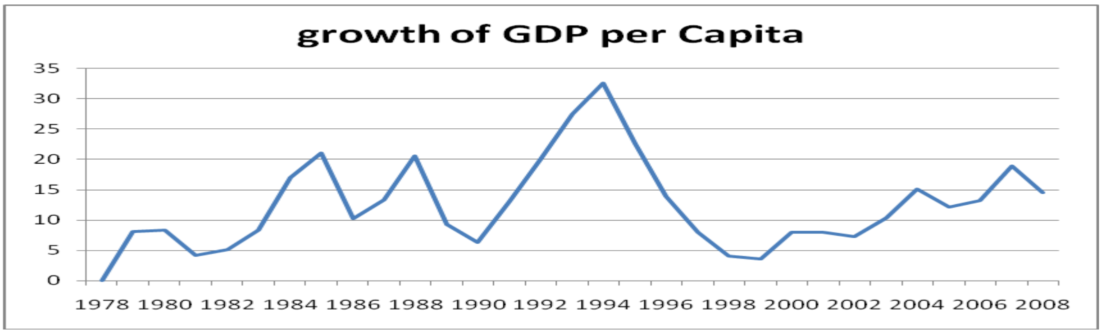

Table 2-15 Chinese GDP 1978-2008

year	*real GDP (bn Yuan)*	*Real GDP Growth %*	*real GDP per capita (bn Yuan)*	*Real GDP per capita Growth %*
1978	361.99		378.58	
1979	396.69	9.59	409.38	8.13
1980	435.21	9.71	443.53	8.34
1981	459.30	5.53	462.13	4.19
1982	490.30	6.75	486.10	5.19
1983	538.79	9.89	526.51	8.31
1984	639.11	18.62	616.41	17.07
1985	784.58	22.76	746.48	21.10
1986	877.70	11.87	822.74	10.22
1987	1011.26	15.22	932.86	13.38
1988	1238.73	22.49	1124.45	20.54
1989	1374.21	10.94	1228.45	9.25
1990	1482.92	7.91	1305.95	6.31
1991	1699.82	14.63	1477.10	13.11
1992	2064.46	21.45	1772.12	19.97
1993	2662.53	28.97	2259.37	27.50
1994	3569.63	34.07	2995.07	32.56
1995	4426.00	23.99	3673.47	22.65
1996	5094.60	15.11	4184.30	13.91
1997	5558.20	9.10	4518.58	7.99
1998	5841.88	5.10	4703.86	4.10
1999	6104.97	4.50	4873.31	3.60
2000	6644.16	8.83	5262.10	7.98
2001	7224.62	8.74	5680.40	7.95
2002	7800.95	7.98	6092.59	7.26
2003	8665.05	11.08	6725.43	10.39
2004	10038.71	15.85	7745.47	15.17
2005	11323.98	12.80	8685.63	12.14
2006	12894.65	13.87	9835.72	13.24
2007	15414.55	19.54	11696.41	18.92
2008	17736.77	15.07	13389.74	14.48

Data source: Chinese statistics year book (1979-2009)

Table 2-16 provincial nominal GDP (million Yuan)

Panel A: coastal area			
Province	1995	2000	2005
Beijing	134,988.00	247,876.00	688,631.00
Tianjin	91,377.00	163,936.00	369,762.00
Hebei	281,573.00	508,896.00	1,009,611.00
Liaoning	150,549.38	466,906.00	800,901.00
Shanghai	243,706.00	455,115.00	915,418.00
Jiangsu*	503,080.00	858,272.76	1,830,566.00
Zhejiang	340,646.00	603,634.00	1,343,785.00
Fujian	214,613.00	392,007.00	656,893.00
Shandong*	491,630.00	854,244.00	1,851,687.00
Guangdong*	537,985.00	966,223.00	2,236,654.00
Hainan	36,417.00	51,848.00	89,457.00
Panel B: hinterland			
Province	1995	2000	2005
Shanxi	107,963.50	164,381.00	417,952.00
Inner Mongolia	83,335.00	140,101.00	389,555.00
Jilin	113,697.00	182,119.00	362,027.00
Heilongjiang	201,060.50	325,300.00	551,150.00
Anhui	191,386.00	303,823.59	537,512.00
Jiangxi	123,271.00	200,307.00	405,676.00
Henan	295,392.00	513,766.00	1,058,742.00
Hubei	324,337.50	427,632.00	652,014.00
Hunan	217,079.00	369,188.00	651,134.00
Guangxi	155,572.50	205,014.00	407,575.00
Sichuan	349,644.00	559,959.00	1,045,560.00
Guizhou	39,694.50	99,353.00	197,906.00
Yunnan	62,698.50	195,509.00	347,289.00
Shaanxi	99,598.00	166,092.00	377,269.00
Gansu	58,292.00	98,336.00	193,398.00
Ningxia	16,379.50	26,557.00	60,610.00
Xinjiang	79,291.50	136,436.00	260,419.00

Data source: Chinese statistical yearbook (1996, 2001, 2009)

However, of noteworthy importance is the disparity in Chinese economic development. GDP in the hinterlands is much less than GDP in the coastal area. The eastern coast and the western hinterland are in different economic stages (Table 2-17). Guangdong, Jiangsu and Shandong are three provinces with the largest GDP value in 1995, 2000 and 2005. All three provinces are located in the coastal area.

FDI stock has a large gap between the eastern and the western areas (section 2.4). Therefore, it raises the hypothesis how the economy level influences the FDI stock and what is the impact of FDI on Chinese regional economic growth. These questions are explored in Chapter 7 and Chapter 8.

2.7 Conclusion

This chapter aims to provide economic background for the empirical chapters. During the last 30 years, foreign direct investment stocks, international trade, and economic development have all received great achievement in China.

The FDI source is limited to a few economies, which are either East Asia neighbour or located far away. The geographic location directly limited the investment type and motivation. This study explores and compares the reasons for the rise of the investment in China from both neighbour and geographically faraway country in chapter 5.

Same as inward FDI stocks, international trade and the Chinese economy have experienced a continued growth over 30 years. An interesting phenomenon exhibited in the trade data series that the most important trade destinations are also the important FDI source regions. The trade volume of multinational subsidiaries takes more than 50% of total trade. Especially, processing trade is the most important trade pattern in China. These statistic data indicate that inward FDIs stimulated the Chinese international trade. However, the growth rate of FDI inflows and trade exhibit opposite direction. This study explores the relationship between FDI and international trade with econometric approaches in Chapter 6.

The regional FDI distribution is highly unequal, as more than 80% of the investment is located in the eastern area. Same as FDI, regional economic development is in different stages. This study investigates the competitive advantage of the eastern and the western area in attracting FDI in Chapter 7 and further discussed the relationship between FDI and regional economy in Chapters 8.

Chapter 3 Literature Review: The Determinants of FDI and its Impact on International Trade and Economy

3.1 Introduction

There are two research focuses on the theory of foreign direct investment. The first focus is on the determinants of foreign direct investment. The second focus is on the impact of FDI. The model concerning the determinant of FDI, the theoretical models are fragmented and stem from several traditional theories. The main theories include the international trade model, investment portfolio model and industrial organization model. The models concerning the impact of FDI include post-Keynesian theory, neo-classic development theory, and endogenous economic development theory. This chapter reviews these fundamental theories, especially the literature relevant to the FDI in China.

The structure of this chapter is as follows: Section 3.2 reviews the literature concerning the concept of foreign direct investment (FDI). Section 3.3 and 3.4 reviews theories and the empirical survey of the FDI determinant in Chinese market. Section 3.5 and 3.6 reviews the literature on linkage between FDI and international trade. Section 3.7 and Section 3.8 discusses the theoretical and empirical studies of the FDI impact on economic growth. Section 3.9 is the conclusion.

3.2 The concept of foreign direct investment (FDI)

Foreign direct investment, as a component of the financial account of the balance of payments, records the capital flows of cross border investment.

OECD defines FDI as the investment which "obtaining a lasting interest by a resident entity in one economy (direct investor) in an entity resident in an economy other than that of the investor (direct investment enterprise). The lasting interest implies the existence of a long-term relationship between the direct investor and the enterprise and a significant degree of influence on the management of the enterprise. Direct investment involves both the initial transaction between the two entities and all subsequent capital transactions between them and among affiliated enterprises, both incorporated and unincorporated." [18]

FDI was catalogued into foreign portfolio investment (hereafter FPI), which is another component of the capital account in the balance of payment. However, the characteristics of FDI are distinguished from FPI.

The first difference is in the aim of investment. FDI investors pursue profit through the successful operation of the direct investment enterprise (subsidiaries, affiliates) and obtains the return based on capital investment, knowledge input and introducing management skills from investors. However, a FPI investor aims to catch the return of the foreign financial products based on relative risk rather than engaging in the enterprise operation practice.

The second difference is in investment period. The investment period of FDI is usually long-run as investor initially looks for long term profit of enterprises. The investment period of FPI could be short-term or long-term, which depends on investment strategies and investor requirements.

The most important difference is in investors influence on operation affairs of enterprises in the board. The direct investment enterprises is recognized by the IMF as an investor "owns 10 percent or more of the ordinary shares or voting power (for an

[18] OECD,1999, *OECD Detailed Benchmark Definition of Foreign Direct Investment,* 3rd edition

incorporated enterprise)", which ensures direct investor can influence the most important decision on operation affairs of enterprises in the board. In contrast, FPI investor usually does not involve operation decision.

Fourthly, the relationship between the direct investor and the direct investment enterprise usually are close. It displays different patterns, such as the representation on the board of directors; participation in policy-making processes, material inter-company transactions, interchange of managerial personnel, provision of technology information, provision of long-term loans at lower than existing market rates (OECD 1999). In contrast, this does not appear between the FPI investor and the investment enterprises.

3.2.1 The financial components of FDI

In the balance sheet of cooperation financial statement, the direct investment capital is usually displayed in three accounts, which are equity capital, reinvested earnings, and other capital associated with various intercompany debt transactions. This composed main financial components of FDI.

Equity capital refers to the investment used to purchase the "equity in branches and the shares in subsidiaries and associates."[19] The investment may include the non-cash acquisitions made against equipment, manufacturing rights, etc., for example, the

[19] OECD put the structure of the sub-level firm into three catalogues by subsidiary companies, associate companies and branches. Subsidiary and associate firms distinguish from each other by the effect of the investor on these enterprises. If the investor has the right "to appoint or remove a majority of the members of direct investment enterprises' administrative, management or supervisory body, the investment enterprise would be recognized as the subsidiary", otherwise, it is the associate firm. Usually, if the investor controls more than 50 percent of the total shares of the investment enterprise, the investment enterprise would be recognized as the subsidiary firm. If the investor has shares less than 50 percent, the investment enterprise is recognized as the associate firm. The branches are recognized as an unincorporated enterprise in the host country.

stock exchange of the investor firm and investment firm or convert the loan of the investment firm to stocks.

Reinvested earnings consist of “the direct investor’s share (in proportion to direct equity participation) of earnings not distributed as dividends by subsidiaries or associates and earnings of branches not remitted to the direct investor.” [20]

And the other direct investment capital (or intercompany debt transactions) covers “the borrowing and lending of funds between direct investors and subsidiaries, branches, and associates”[21]. The OECD recognizes all the loans provided by the subsidiary or associates to the parents firm as the foreign direct investment with the exception of SPE (special purposed enterprise) and the loan from the parent bank with the international banking service industry and also the loans provide from the parents to the subsidiaries. UNCTAD even expends the scope of inter-firm flow by including trade credits, bonds and money market instruments, financial leases and financial derivatives.

FDI is captured by the sum of these three groups of components: equity capital reinvested earnings and intercompany debt transactions.

The liability of foreign direct investment account in the nation’s balance of payments indicates that the account of FDI inflow and the asset of the foreign direct investment account minus the FDI outflow of the countries. The balance of payment of China, for example, has an increase in both the increase in both asset and liability of the FDI account; however, the net value of the account displays a positive FDI inflow, which indicates more FDI inflows than outflows.

3.2.2 FDI measurement: FDI flows and FDI stocks

Two types of data series are available for FDI: FDI flows and FDI stocks. FDI stocks reflect the accumulation of FDI flows. UNCTAD summaries the measurement of FDI stock by “either cumulating FDI flows over a period of time or adding flow to an FDI

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[20] IMF,1992, *Balance of Payments Manual*, 5th edition

[21] IMF,1992, *Balance of Payments Manual*, 5th edition

stock that has been obtained for a particular year from national official sources or the IMF data series on assets and liabilities of direct investment". Both the FDI flow and FDI stocks are presented at book value or historical cost, reflecting prices at the time when the investment was made.

3.3 Theoretical foundations of the determinant of FDI

Two groups of research have dominated the FDI theories since 1960s. The first group explained FDI via the balance of payment approach, which investigated the interaction between the interest rate, the exchange rate, the current account, FDI and other form of short and long term capital movements in the national balance of payments. This group of research stemmed from portfolio investment theories, which aim to build the optimal investment portfolio through the trade-off between return and risk of capital investment. The second group explored the FDI theories through the real economy, which investigates firm specific assets, foreign market entry choice and the location choice of multinationals to pursue the maximum profit for the entire corporation rather than the headquarters or subsidiaries in a specific country.

3.3.1 Balance of payments approach

The literature on FDI via the balance of payments approach originated from traditional investment theories, which is concerned with investment return, cost control, risk hedge and diversification of investment. FDI is considered as a "form of international portfolio investment" [22] in this approach.

The influence of interest rates on foreign direct investment

Traditional portfolio theories consider FDI as an important tool to hedge the exchange rate risk of international loan. International capital borrowers face the risk of home currency depreciation (Aliber 1970, 1974). Investors in a country with higher interest intend to hedge the exchange rate risk through portfolio strategy of FDI outflow and

[22] Aliber ,1970, *A Theory of Direct Investment*, The International Corporation

capital borrow (debt and loan). Therefore, countries with high interest rate are more likely to have FDI outflow, while countries with low interest rate are more likely have FDI inflow.

However, this theory has faced some challenges. Firstly, short-run changes of interest rate cannot explain the motivation of FDI. The theory could only be applied in long-run debt or loan but not short-run debt. The long-run investment characteristics of FDI could not hedge the instant changes of interest rate and exchange rate. Secondly, the theory cannot explain the bilateral flow of FDI between two countries. Thirdly, the theory cannot explain FDI flows from the regions with a lower interest rate to the regions with higher interest rate. The investor behaviour does not always compatible with the investment portfolio theory.

In the FDI modelling, interest rate is used as an index to measure the economy confidence (Wei et al., 2001). The economy with long-run stable interest is expected to have a suitable investment environment for foreign capital. This provides a new explanation of interest rate in the FDI.

The influence of exchange rates on foreign direct investment

Froot and Stein (1991) have noticed the impact of exchange rate on the investment decision of multinational firms. The relevant literature has recognized some channels of the exchange rate influence the volume of foreign direct investment. Firstly, fluctuations of the exchange rate change the final return of the investment in terms of domestic currency for the cross-border investors who aim to capture the highest investment return. Secondly, fluctuations of the exchange rate change the price of overseas input cost such as the labour price. This directly leads to a rise or reduction of production costs (Klein and Rosegren, 1994; Dewenter, 1995). Thirdly, fluctuations of the exchange rate change the equity value to overseas investors. Froot and Stein (1991) introduced investment behaviour model into exchange rate research. NPV (net present value), a concept from investment theory, is estimated by the investor according to the value of future earning capability and asset value. The depreciation of the foreign currency decreases the price of an overseas target firm. Once the price is lower than the net present value (NPV), the multinational enacts the acquisition. There is an FDI inflow accompanied by the currency depreciation. Fourthly, fluctuations of exchange rate change the value of multinational's specific assets, which results in international acquisition and merger activities (Blonigen, 1997). Furthermore, fluctuations of exchange rate itself influence the profit certainty, which stimulates the foreign direct investment due to the specific production and market strategy of multinational corporations (Cushman, 1985).

The relevant empirical researches found the depreciation of Yuan (Chinese currency) stimulates the flow of FDI to China (Fung et al., 2000; Keer and Peter, 2001). However, there are two studies which need to take the notification. Chou (2001) focus on the influence of exchange volatility on the Chinese exports and found a negative long-run effect of exchange rate volatility on Chinese international trade, which indicate that exchange rate uncertainty impedes trade with China. Foreign investors and trade partners can avoid or minimize the exchange rate uncertainty by hedging in the forward exchange market. However, the forward currency market for the Chinese Yuan does not exist. Thus the trading activity with China in long term is unprotected by forward market. As long as trade is unable to eliminate exchange rate uncertainty, large exchange rate variability will reduce the trade volumn. Therefore, the long-run impact of exchange rate volatility on China's exports is negative. The investors avoid the financial risk in the currency market through outward FDI. Thus, the volatility of the local currency raises FDI into China if it has a complementary relationship with trade, or reduces FDI inflow if it substitutes with the bilateral trade.

Rather than focus on the exchange rate between FDI source countries and recipient countries, Xin and Wang (2006) focus on the exchange rate between the FDI recipient countries, which have substitution relationship. They argue, if one of these countries depreciates the currency, the FDI to the other countries will decrease. The majority of inward FDI in China is from the developed economies. There is a competition China and similar developing economies. Xin and Wang (2006) found that the undervalued Chinese RMB drove the investment in Asian-4 countries to China. Although the theory did not give the perusable reason to explain such a phenomenon, it discloses a competitive relationship between FDI reception regions. This competitive relationship is more obvious on efficiency seeking FDI in China rather than market seeking FDI.

The balance of payment approach contributes to the literature on FDI in applying financial methodology. Interest rate and exchange rate are the most important financial factors for FDI. However, this approach has its limitation as FDI has different characteristics from portfolio investment (Section 3.2). The traditional investment theory could not explain FDI in some cases. For instance, as a type of long term investment, FDI is less elastic to the short-run changes of financial markets. Furthermore, FDI is far beyond the pure physical capital movement, which transfers advanced techniques and knowledge, management skills, and successful enterprise skills. The overseas expansion of Multinational Corporation has to follow its global business strategy. The purely financial returns are not the only factors which stimulate the foreign investment (Hymer 1960).

The second stream of FDI research emphasises that the direct investments are capital movements associated with international operations of firms, management, and technology transfer.

3.3.2 International trade theories

The foreign direct investment was developed in international trade theory framework. Two pioneering work of international trade theories, Ricardo model and Heckscher – Ohlin model, explore the determinants of global production. This built the theoretical fundament for the future FDI model.

Ricardo model argues that production location is determined by the differences in labour productivity, which is caused by the production technique gap between the countries. Each country produces the goods with relative higher productivities and imports other goods.

The model has explored the relationship between technology and production location of multinational firms. The advanced technology increases the productivity. Therefore, production is concentrated in regions with higher productivities. The gap between market demand and production amount through international trade. However, the theory assumed technology as an exogenous variable in this model, which neglects the technological innovation.

The Heckscher - Ohlin model argues that production location based on the production factor endowments rather than technique difference rather than technique differences. It argues that each country produces the good using its abundant factor and exchanges the goods using its scare factors through international trade.

This model discussed the impact of factor endowment on production location decision. The model indicates production is concentrated in the regions with its abundant resource. The gap between market demand and production are filled with international trade. However, this model faces the challenges. Firstly, the model assumes that technology is freely accessible by all the countries. However, in reality, technology information could not be acquitted freely in most of the business. Since technology raises the productivities difference, information could not be totally free for all countries. Due to the profit of technology information, technology should be developed by the profit stimulation. Secondly, according to the model, the difference in product price cannot raise FDI. The model argues the factor endowment could not result in the factor price gap, as the factor price will be equalized through international trade. A specific product can be produced in different countries with the same cost. Therefore, without considering the transportation cost and scale of economies, multinational firm will not be attracted by factor endowment, because FDI pursues the high investment return. This assumption has been challenged by later OLI model, industrial organization models.

Furthermore, these two international trade models received the criticism from three other aspects. Firstly, the assumption of perfectly competitive market and constant economics of scale limitate the model to explain the problem in the real economy. Second, the models stand on the supply side of production but neglect the market demand effect. Thirdly, the models did not raise the concept of FDI.

3.3.3 Industry organization theory

In response to the critics on the perfect competitive market assumption of international trade theory, industrial organization theory developed from an imperfect market structure assumption. Hymer (1960) provided the pioneering work in this theory.

Hymer (1960) argues that market is imperfect and multinational firm have to process the monopoly power to compete with local firms. Local firms have a competitive advantage over foreign firms. Therefore, multinational firms need to have some compensatory advantage to offset the disadvantage. These compensatory advantages can arise from exclusive and permanent control of proprietary technology, privileged access to inputs, scale economies, control of distribution systems, product differentiation and government intervention. Kogut (1983) supports Hymer's theory by arguing that MNE are more efficient in cost reduction in foreign market and production. Furthermore, Buckley and Casson (1976) and Brown (1976) support Hymer from the information cost. They argue that enterprise can bypass market imperfections for knowledge intermediate goods in the form of the MNE. The public goods nature of information asset results in a completely market failure for these information or knowledge based products. Internalized production is one of the solutions to this market failure because it keeps the advanced knowledge or technical skills inside firm. In the form of MNE, the information product user also works as the information supplier. There is no need to price the knowledge based products. Furthermore in the form of MNE, enterprises can benefit from the internalization by avoiding the transaction costs and communication cost reduction, information imbalance, relevant extra tax and exchange rate policy and default costs.

The challenge for Hymer's theory is that it cannot explain the fact that MNE only exist in specific industry not the other even market imperfection exist. In response to this question, Kindleberger (1969) and Caves (1971) restated Hymer's research under the Structure-Conduct-Performance framework. It argues that FDI is most likely to exist in an industry dominated by oligopoly power. In an oligopolistic industry, only few firms process technique advantages. Once a firm enters the new market, the others have to follow the behaviour and enter into the market; otherwise, the technique advantage cannot bring the new market share.

3.3.4 The product life cycle theory (PLC)

Product Life cycle theory (Vernon 1966, 1974) argues that the production location of labour saving – capital intensive goods changes during the whole product life in the market. Its production initially happened in the innovation countries (especially, the U.S), then move to developed countries, and end up in the developing countries (the classification is according to the technique level). The multinational firms service the global market through the strategy combination of trade and FDI, based on the changes of market structure.

During the limited life of a product, it declines through four stages: introduction, growth, mature and saturation. In the first period, the product is launch into the market from the innovation country, sales volume are small and the production cost is relatively high, therefore, the profit from production is low, although it is in the monopoly market as no similar product exists. The production of the goods is located in the home market because the products are not completely mature and need promptly improvement and adjustment. Target client is limited in the domestic market.

In the growth stage, the product technique is more mature, sales increase and production costs are reduced due to the economies of scales, therefore, profits increase. However, the increase of profit results in greater competition and similar products emerges in the market, competition exists both in the domestic and foreign markets, and demand turns to be more price elastic. In this stage, the firm has to consider setting new plants abroad due to the increasing demand in the domestic and foreign markets.

In the third stage, the technique is mature, sales continue to increase and the cost keeps reducing, while the product price decreases, as the profit results in new competition. The firm has to focus on the brand differentiation and diversification to keep its market share.

In the fourth stage, the technique is standardized, technique price competition is more intensive and the decisions about production location are highly influenced by cost considerations. Global production becomes concentrated in the regions with cheaper input resource with economy of scale. The final goods will export from the overseas plant to global market even to the home market.

According to the model, international trade and FDI displays both complementary and substitution relationship during the whole process. Multinational firms serve the global market starting with the export of final goods into that market and ending up with production in foreign market, even importing goods back to home market or to third countries.

3.3.5 OLI model and the Eclectic paradigm

Dunning (1981) pioneered a new framework, which is named as the eclectic paradigm The model analysed the ownership (O), location (L), and internalisation (I) advantages of the firms as the three elements of production and investment decision of multinationals. The eclectic paradigm is the main theory to explain the MNE activities in last 30 years. It has been widely applied in many social science fields (Cantwell and Narula, 2003).

3.3.5.1 Three pillars

Ownership advantages (also named as firm specific advantages) are identified as the productivity differences which were presumed to rely on the intangible assets of the parent companies, which are spatially transferable to the subsidies overseas (Dunning 2001). These raise the competitive advantages in foreign markets (Dunning, 1988, 1998; Eden, 2003).

There are two important characteristics of ownership endowments. Firstly, it is not restricted to any geographic location. Second, the public good characteristics, there is no duplication cost of knowledge asset. These characteristics stimulate firm peruse the economy of scale and motivated the market expending.

The ownership advantages are in the form of the technological capacity, awareness of technological opportunities, trademarks, technical and human productive capacities, and distribution and service networks. Dunning (1988) catalogued these ownership advantages into two groups: *asset* and *transaction*. The *asset* advantages refer to the ownership of specific assets created and/or acquired by MNEs. The *transaction* advantages "*arising from the common governance of a network of these assets, located in different countries*" (Dunning, 1988). These advantages must be sufficient to compensate the cost of setting up and operation in a foreign market.

However, the ownership advantage is highly dependent on the rival's competition capability and the technique level of foreign market. Hymer (1960) for instance pointed out that the firm specific asset is threatened by rival MNEs who launch new product lines incorporating new technology or other types of firm-specific advantages.

The economic and technique development of host country is another factor influence the ownership advantage. Dunning (1980) pointed out that "the ability of enterprises to acquire ownership endowments is clearly not unrelated to the endowments specific to the countries in which they operate and particularly their country of origin." For instance, a US multinational firm with technique - intensive products obtained more advantage over the local in a less developed countries. The theories were supported by the papers of Kim and Lynn (1987), Lall and Siddharthan (1982); Schroath, Hu and Chen (1993), Shan and Hamilton 1991), Buckley (1990), Casson (1987) and Dunning (1980), Dunning (1995), Itaki (1991), Stopford and Wells (1972), Gatignon and Anderson (1988), Giddy and Young (1982), Wells (1983), Kumar and Kim (1984), Lecraw (1993).

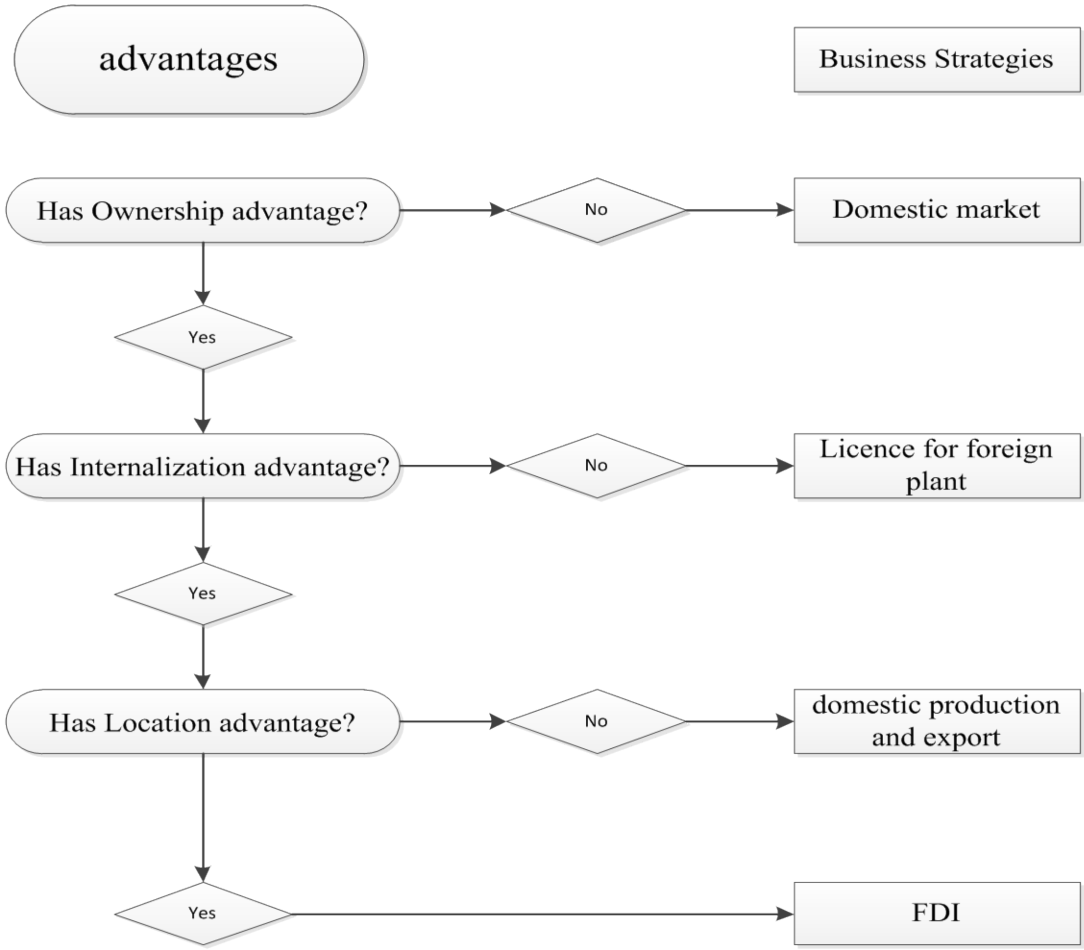
Location advantages (also named as countries specific advantages) indicate that the multinational process is complete or part of the production abroad to reap the benefits of cheaper production.

Location advantages are raised due to the impact competitive market. These factors are in the form of available nature production resource, cheaper labour or capital input endowments, tax policy, and government intervention and also the endowments of interdependent immobile assets, the spatial integration of complex and rapidly changing economic activities and the role of national and regional authorities (Dunning, 1995).

Internalization advantages indicate the multinational can obtain more profit if it sets up a new plant in the foreign market rather than sell the permission to the foreign firm of the firm specific asset abroad through a grant licence. The multinational grows through a direct presence in various markets via internalized production. The licence grant, on the other hand, creates an internal market between the headquarters and affiliates in various markets directly.

With the advantages of these three pillars, the multinational firm could expend overseas market through FDI. The ownership advantage is the precondition for the multinational to enter into the foreign market. Once given the ownership advantage, the multinationals have to decide the entry approach through internalization or selling the ownership advantage, through a license. Once a firm has both the ownership and internalization advantages, the multinational firm will decide the production location in the home country or in the foreign country. If the location advantage exists, the multinational firm will service the market through FDI.

OLI model is not static. The dynamic OLI could explain the real FDI behaviour. The establishment of foreign direct investment in the foreign countries raises the profit of multinational firms. However, the opening of the new market, the discovery of cheaper resource or strategic asset will raise the competition, which will continuously reduce the location advantage. The multinational firm has to seek the new market or adjust its innovation capability in response to the location advantage changes. Therefore, three pillars are having an impact on each other during the process.



3.3.5.2 FDI Types

The advantages in three pillars ensure the capability of FDI in foreign market competition. Besides, Dunning explored the reasons for multinational firms to expend in foreign market. He catalogues foreign direct investment in five types according to their investment intentions, which are *resourcing seeking*, *market seeking*, *efficiency seeking investments*, *strategic seeking investments* and *support* investments.

From market side, *market-seeking* FDI intend to develop new foreign market or increase sell in existing foreign market. The factors stimulate market seeking FDI includes large and growing domestic markets; competitiveness within the industry of the host country; the quality of national and local infrastructure; macroeconomic policies; proximity to customers; agglomerative spatial economies and local service support facilities; and promotional activities by regional or local development agencies (Dunning, 1998).

Resource-seeking FDI and *efficiency-seeking FDI* focus on element from production side. The former one intends to access natural resources (Dunning, 1998). The latter one is influenced by labour costs and availability, the competitiveness of the market, infrastructure quality, local services and proximity to users (Dunning, 1998).

3.3.5.3 Investment Development Cycle

The theme of the development cycle theory (Dunning 1981) is that a country's international investment position in developing countries, which is measured by inward direct investment per capita (IDI), outward direct investment per capita (ODI) and net direct investment per capita (NODI) depends on the recipient country's stage of economic development and its ownership advantages, internalization advantages, and location advantages. Dunning distinguishes four stages of investment development.

In the first stage, countries have little direct investment outflows, and rarely receive direct investment, net foreign investment is nil. This is because these countries do not have ownership advantages, there is no internalization, and therefore it does not fit the requirements for foreign investment. If there is not large enough domestic market and a favourable investment environment, the foreign capital inflow is very small.

In the second phase, countries receive direct investment so that net foreign direct investment is positive and this net value is increasing, which means more inward foreign investment is absorbed than outflows FDI. This shows that since the implementation of import substitution, market expansion, investment in environmental improvement, the location advantage stimulates direct investment inflows. However, with the limited growth in business ownership advantages, it is difficult to overcome barriers to international production so the outflow of direct investment is still small and concentrated in neighbouring countries.

In the third stage, net outward foreign direct investment is still negative, but its absolute value continued to decline, which is due to a reduction of inward foreign investment, or the speed of outgoing foreign direct investment is faster than the speed of acceptance of foreign investment. At this stage, the countries to enhance corporate ownership-specific advantages, the ownership advantage increase in the foreign market, while, ownership advantages of foreign investment enterprises in domestic market decline.

In the fourth stage, net outward foreign direct investment is positive, which means that more outward foreign direct investment growth is faster than inward direct investment growth. This indicates that the multinational firm has strong ownership advantages and internalization capabilities, but also find location advantages to invest abroad.

Table 3-1 The OLI advantages for inward and outward FDI in different economic stage

	Inward FDI		Outward FDI	
	Advantages	effect	advantage	effect
First stage	Ownership advantage of foreign firm	sufficient	Ownership advantage of domestic firm	no
	Internalization advantage of foreign firm	sufficient	Internalization advantage of domestic firm	n.a
	Location advantage of domestic firm	increase	Location advantage of foreign firm	n.a.
Second stage	Ownership advantage of foreign firm	sufficient	Ownership advantage of domestic firm	small
	Internalization advantage of foreign firm	sufficient	Internalization advantage of domestic firm	little
	Location advantage of domestic firm	increase	Location advantage of foreign firm	little
Third stage	Ownership advantage of foreign firm	decrease	Ownership advantage of domestic firm	increase
	Internalization advantage of foreign firm	decrease	Internalization advantage of domestic firm	increase
	Location advantage of domestic firm	decrease	Location advantage of foreign firm	increase
Fourth stage	Ownership advantage of foreign firm	decrease	Ownership advantage of domestic firm	increase
	Internalization advantage of foreign firm	decrease	Internalization advantage of domestic firm	sufficient
	Location advantage of domestic firm	decrease	Location advantage of foreign firm	increase

3.4 The empirical survey on the determinants of FDI in China

3.4.1 The National Level

3.4.1.1 Methodology

The literature concerning the national inward FDI to China has been developed in two data level. One is through a time series , which studies the overall determinant for overall investment in China, or the FDI from a specific source country to China. The studies include Wang and Swain (1995), Hong and Chen (2001) and Zhang (2000).

The research on aggregate investment in China is limited. Hong and Chen (2001) explore the determinant of FDI within the time period from 1985 to 1997. The research on the country pair research includes Hong and Chen (2001) and Zhang (2000). Hong and Chen (2001) explore the investment from the United States, Japan, Hong Kong, and Taiwan during 1988 to 1996/1997. Zhang (2000) compared the investment from the United States and Hong Kong in the time period from 1979 to 1997. Different from Hong and Chen, who applied the absolute value of the data series, Zhang adopts the relative ratio value of Chinese data in terms of sourcing country value in the empirical regression.

The other researches concerning the inward FDI to China at the national level applied the panel data. The main econometric methodology includes OLS pool, fixed effects, and Random effects. Wei (1995, 2000) applied the fixed and random effect on FDI inflow and FDI Stock panel from 5 developed source countries[23], covered the time period from 1987 to 1990. Dees (1998) applied fixed effect measure with the FDI stock panel from 11 source countries[24] within the time period from 1983 to 1995, in his model. Liu et al. (1997) and Wei and Liu (2001) applied the OLS and the Random effect on the contracted FDI panel for 22 home countries over the period of 1983-1998 and realized the FDI panel of 19 home countries over the period of 1984-1998.

[23] These 5 source countries include Japan, United Kingdom, and United Sates, France and Germany.

[24] These 11 source countries are Hong Kong, Taiwan, United States, Japan, Singapore, South Korea, Thailand, United Kingdom, France, Canada and Italy.

However, the researches with panel data have its limitation. As the FDI flowed from China from few countries, the data sample is quite small. Pervious researches has limited in few resource countries. Besides the investment from main resource regions, such as Hong Kong, the USA, Japan and Taiwan, the investment amount from other regions is not unstable. With the small sample size, the regressions are likely to be biased. Therefore, panel research does not suit the research for the Chinese market.

The researches by time series data do not suffered from the limitation of the sample size. However, the most of the previous researches apply static approach rather than dynamic approach. As the analysis applied the macroeconomic analysis, the dynamic analysis is superior than the dynamic approach.

3.4.1.2 The explanatory variables

Chinese Market size

The empirical estimations recognized the marker size factors as a significant effect on inward FDI. All the studies support the hypothesis that the Chinese market size is an important factor for the inward FDI. An increase in Chinese GDP indicates the growth of Chinese market size, which is especially important to the market oriental investment, as the growing market could create new business opportunity. For the export – orientated investment, the market development could affect the transportation and total cost and influence the multinational production location decision (Markusen 1996, 1997). The measure valuable includes GNP (Wei 1995, 2001), GNP per capita (Wei 1995, 2001), GDP (Dees 1998), and GDP ratio of Chinese to home country (Liu et al 1997, Wei and Liu 2001).

International trade

Exports could exhibit a substitution or complementary relationship with FDI. The export-related FDI could appreciate a positive influence by the trade and negative effect from

tariff. However, for the market development, FDI could be viewed as an alternative channel of export to serve the foreign market.
The international trade effect has been considered in Dees (1998), Liu et al. (1997), Wei and Liu (2001), Dees et al.(1998) valued the data as the export/GDP rate, while Liu et al., and Wei and Liu value the data as a real form of data. Both the researches support a positive export relationship between the trade and inward FDI.

Wage

The larger labour market and lower wage level in China could raise the incentive of multinational transferring the production location in China (Helpman 1984, Krugman 1984) as the majority of China - located multinationals cluster in the manufactory industry. The cheaper Chinese labour input could effectively reduce the total production cost and increases the competitive capability of multinational in the world market.

However, Hong and Chen pointed out low Chinese wage (2001) could stimulate inward FDI but Zhang (2000) could not find any significant Chinese lower wage effect on FDI from United States. But both of them found the large Chinese market and lower wage level could attract the investment from Hong Kong.

The cheaper labour is another factor in the papers by Dees (1998), Liu et al. (1997) and Wei and Liu (2001). Dees applied the China wage ratio in terms of Asian wage, Liu et al. (1997) and Wei and Liu (2001) applied the wage rate of Chinese labour in term of source country value. All these empirical works indicate that low Chinese labour cost attracted the inward foreign investment.

Wei and Liu have considered the borrowing cost as the determent variable for the FDI model, which is measured the as the ratio of Chinese lending interest rate to the source countries. The results indicate a significant negative effect, which could be explained as the higher borrowing cost in China, the less investment here.

Capital cost

Capital cost is another factor may influence the FDI. Same as the exchange rate control, Chinese authority have long-run propel the financial system reform. However, the market interest rate is still following the official interbank rate given by the central bank. The reform had a long way to the completely free market. The low interest rate in China could promote more borrowing in China and further stimulate the investment.

Excnage rate

A real depreciation of Chinese Yuan could favour the foreign firms' purchase of the host country's assets and allows foreign investors to take advantage of the relatively cheap labour in the host country. Therefore, depreciation is expected to be positively associated with FDI inflows. Furthermore, the Chinese exchange rate is long term pegged to the US dollar, although since 2005, it turned to a more flexible regime. The Chinese authority applied the exchange rate as an in important instrument to impel the export. A depreciation of the Chinese Yuan will lead to a reduction of foreign export to China, which may cause the investment to entry Chinese market rather than through exporting approach.

The third economic factor applied in Chinese FDI research is the exchange rate. Dees (1998), Liu et al. (1997), Wei and Liu (2001) input exchange rate variable into the FDI model. The exchange rate of Chinese RMB (Yuan) against US dollar was chosen as a measure. And the regression result that the depreciation of Chinese Yuan could encourage the realized inward FDI.

Tariff

Zhang introduced trade barrier (tariff), time trend, US policy containing of China and Chinese political stability effect into an empirical model for US-sourcing FDI. The result indicated a higher tariff would motivate the FDI inflow to China. The uncertainty bilateral political relationship, on the other hand, could reduce the investment intention.

Zhang further explored the effect of the tariff, time trend, political stability and tax policy on investment from Hong Kong. The empirical results exhibited an insignificant effect tariff, but Zhang suggested "the tariff effect on Hong Kong is negative, because the incentive policy of China to Hong Kong is to pay back the tariff the Hong Kong multinationals on the import of intermediate and raw material if it is exported back", which is different with the US-sourcing FDI. He also found that the tax policy for the export-orientated FDI is an important influence factor to these Hong Kong investors.

Other factors applied in the paper include the human capital by literacy rate (Wei 1995, 2005), country risk, geographic distance, cultural difference (Liu et al. 1997, Wei and Liu 2001), parent firm location and political affair (Dees, 1998).

Summarising relative research above, market size, wage level, export, exchange rate, capital cost have been used as the main determinants of inward FDI. However, the geogoraphy location has seldom been explored.

The geographically location influence the motivation of FDI flows. Cushman (1986) introduced the geographic influence into FDI location choice. They have investigated how multinational firms balance the market size effect and the transportation cost effect in overseas subsidiaries setting. Concerning the FDI in China, there are two groups of important resource regions: East Asian neighbours and EU/US regions. The different geographic location of groups reflects in the different transportation cost, which influence the motivation of multinational firms to China. Due to the limitation or advantage of geographic location, the effect of these previous variable may have different effect.

3.4.2 Regional distribution

3.4.2.1 Mthodology

There is a large amount of papers concerning FDI determinants for special distribution. Most of these empirical researches estimation applied the panel data. In the data scope, there are two different level of data use for the research. One is the city level data, which includes Head and Ries (1996), Zhao and Zhu (2000), Liu (2009). The other group is the provincial level data, which includes Broadman and Sun (1997); Wei et al (1999); Cheng and Kwan (2000); Fung et al (2002); Sun et al (2002).

The most research methods for panel include the pooled panel, fixed effect, and random effect approaches. Cheng and Kwan (2000) applied GMM estimation.

In the estimation with city level data, Head and Ries (1996) use the 54 cities in time period 1984-1991 to explore the influence of domestic enterprise number, wage, infrastructure influence and special economic zone policy variable on FDI investment. Zhang and Zhu (2000) investigated 50 cities in 4 year time period, to explore the influence market potential, export, economic efficient, product input cost, infrastructure, technique level and culture backgrounds influence on FDI within OLS approach. Liu (2009) explored the relationship between FDI inflows per capita with GDP, coastal location and infrastructure with a panel of covers 98 cities in 16 hinterland provinces in the time period of 1999 – 2007.

In the literature to province data level, Chen (1996) explore the relationship of FDI with market potential, wage, transportation infrastructure, agglomeration efficiency, technique level during the period 1987-1991. He divided the data into three subgroups, which are the eastern area, middle area and the western and compare the effect in these three subgroups. Boardman and Sun (1997) discussed the influence of province GNP, labour cost, and infrastructure. They further use the illiteracy rate as the proxy to measure education influence. Different with research by Chen, Boardman and Sun set coastal location dummy to catch the coastal investment difference with the hinterland. Coughlin and Segev (2000) applied the panel of 29 provinces in China in the time period during 1990-1997. They investigated the influence of local GPP, labour productivity, coastal dummy, read level, highway and air-staff on FDI inflow. Here they have considered the air staff as the infrastructure measure for the investment. Wei et al (2001) explores the contract FDI inflow and realized FDI inflow with trade, average wage, GDP growth rate, skill labour, infrastructure, agglomeration effect, information cost and investment incentive. The research is in the panel of 28 provinces in China through a time period of 1983-1998 with OLS and Random effect research approach. In the estimation, they use the skill labour in terms of total employment and skill labour in terms of the total population ratio as a measure for the skills labour. Furthermore they use the population to land area to observe the agglomeration effect of market density. Cheng and Kwan (2002) applied GMM estimation to explore inward FDI stock with wage, income, education infrastructure, and policy (SEZs) with

29 provinces in China in the time period of 1985-1995. Fung et al (2002) explores the relationship between FDI inflow with regional GDP, average wage, university student rate to the total population, infrastructure and policy with POOL FE and REGLS approach. Different with the other research discussed the all the investment in China. Fung et al (2002) researched the particular FDI from Unites States, Japan, Hong Kong and Taiwan and compare the spatial distribution of the investment from these four particular source regions. Sun et al (2001) applied the panel research of 29 provinces in China with full time period of 1986-1998. To reflect the influence of difference development changes, which is watershed by Deng Xiaoping south tour speech in 1992, they created two time subgroup for estimation from 1986-1991 and 1992-1998. Furthermore, due to the long history of Guangdong and Fujian location advantage, which are geographically close to Hong Kong, Taiwan, and Macao, they have a comparison of the dataset of 30 provinces which including Guangdong, Fujian with the dataset of 28 provinces excluding Guangdong and Fujian.

The advantage of cities level data is that it creates a large research sample as we notice the individual data in these studies are large. However, on the other hand, it may have a sample bias problem. As the cities may not contain all the investment in China, which may not complete reflect the investment reality.

Panel approach more effectively deals with the Chinese provinces dataset. However, most previous studies only explore the statistic effect of the factor thorough traditional Fixed Effects and Random Effects approach and assume the variables are exogenous. Cheng and Kwan (2002) and Yao (2006) applied Arellano-Bond difference GMM approach. However, this approach also suffers from the small data sample.

3.4.2.2 Variables

Summarizing the research on the determinant of FDI distribution in China, the influence factors could include local market demand, local market growth, openness, labour cost, skill labour rate, education level, technique level, local infrastructure, coastal area effect and political influence etc (Table 3-2).

Market size

First of all, market size and economic level. GDP, GDP per capita, GNP, and GNP per capita, GDP growth rate usually have a significant positive coefficient in the literature for cities level data and province level data. It often used as proxy to capture market demand and size effect. However, we believe that multinational investment in China, especially, market seeking investment would not only develop local market, but the entire Chinese market, because GDP or GNP could also represent development level of regional economy, GDP growth could represent the future development potential. Here, we choose to use the GDP growth rate, which is applied by Wei et al (2001), to measure the regional economic development potential. We suppose the higher economic level or between economic environments would motivate the FDI located in the region.

Openness

The openness is another important factor would influence FDI inflows to the region. Wei (2001), Zhang and Zhu (2000) have used trade as proxy variable for the local openness. Openness of the regions is expected to motivate all the business entities to learn the background, culture, regulations from the cooperation partners. This may result in more business or investment opportunity in the future. The empirical results related openness influence demonstrated a positive influence of trade volume to the regional inward FDI.

Wage

Lower labour costs are recognized as an attractive factor for foreign investment (Huber and Pain 2002; Barrell and Pain 1997, Wheeler and Moody 1992). The researches related to FDI in China demonstrated that low labour cost is an important factor in the location decision of the multinationals with the intention to explore international differences in factor prices which was applied as an explanatory variable in almost all the research papers we mentioned in this section. Particularly, the inward FDI in China clustered in the labour intensive manufacturing industry, employing cheap labours could reduce the production cost for the multinationals. As we found in the last empirical chapter in national level research, the large wage gap may lead inward FDI. Labor cost, measured by wage, is supposed to have a negative relationship with the FDI spacial distribution. This has been proved by Coughlin & Segev (2000), Cheng and Kwan(2000), Fung et al., (2000), Wei et al.(2001). However, such a measure is not without problems. For example, Branstetter and Feenstra (1999) found multinational firms in China tend to pay a wage premium to their worker to avoid the outflow of the human capital. Zhao and Zhu (2000) found the existence of the significant positive relationship between the wages and the FDI inflow into China. Swedenborg (1979), Dunning (1980), and Veugeler (1991) argue that wage could act as a measure of labour quality. This may explain the empirical results by Zhao and Zhu (2000) as the cluster of higher skill labours which foreign investors seek, may influence the location decision. The empirical results of the wage effect on FDI stock are relatively ambiguous. Sun, Tong and Yu (2002) found that, in Chinese market, the wage is positively related to FDI before 1991, but turned to be negatively related after 1992. No significant relationship between FDI and wage cost is found by Head and Ries (1996). Chen (1996) could not find the significant results of wage in on inward FDI in the eastern, middle and the western area of China.

Although relative cheaper labour could be an important factor in the location decision, the human capital quality would be expected to support the development of the FDI in China. The labour quality could be often measured by the illiteracy rate (Broadman and Song, 1996; Coughlin and Segev, 2000), university student rate to population (Liu 2009; Fung et al., 2000) senior, junior and primary school student education population (Cheng and Kwan 2000). Except the paper by Cheng and Kwan, all the empirical work indicates that regions with higher education rate will attract more inward FDI.

Technology

R&D expenditures and number of patents, high level of scientific research are often used as the technique level of local economy. OLI model argues that multinational will apply firm specific advantage in host market. These advantages could include management skill and technique or engineering know how. However, the transfers of these techniques need the support from local technique capability. Specially, technology could not be applied directly into the Chinese market, which requires the local support team to create new technology, for instance, Avon establish two new cosmetic research centers in Guangzhou and Shanghai, which focus on the Chinese skill character according to specific weather and environment in China. In this case, the higher local research capability could attract more FDI. The papers concerning the technique level of China are limited. Wei et al (2001) and Sun et al (2002) mentioned the R&D Manpower. They applied RSET (number of research scientists, engineers and technicians to regional employment or to regional population) as the proxy. Wei indicates a positive relationship between RSET and inward FDI. However, Song et al report a negative effect of RSET in sample period 1987-1991, an insignificant result during period 1992-1998.

Infrstrusture

The local infrastructure might influence the extra establish cost of the subsidiaries for the multinationals. The basic infrastructure constructions are important for attracting the investment by reducing the expenditure. The GDP per square kilometer is a proxy for the quality of infrastructure. Highway, railway mileage, River, paved road per square kilometer and air staff are expected to relate positively with FDI (Chen 1996, Sun et al. 2002; Cheng and Kwan 2000). Wei et al. (2001) indicate a positive effect of the road, but no significant effect of railway infrastructure. Coughlin and Segev (2000) obtained positive insignificant coefficient on air staff and highway. Liu (2009) has a panel analysis on the infrastructure influence on FDI in detail. The research covered several aspects of infrastructure, which includes transportation, communication, and environmental protection, education, medical & recreational. Education effect we have already discussed, the results indicate the positive relationship on road and communication variables and negative effect on environment. The results of the variable are not significant.

Aggolomerate effect

Agglomeration effect is related to the investment externality. The cluster of customer would motivate the investment. Wei (2001) has explored the population density, which is measured by population in terms of land. The results have a positive effect. Sun et al. (2002) use the accumulated FDI in terms of local accumulated investment. The local capitals are expected to have a competitive relationship with the FDI in order to reap the profit of investment projects. The concentration of local capital would drive out FDI due to the domestic protection.

Policy and location effect are usually measured by dummy variables. The local effect usually refers to the coastal area and the hinterland. The policy dummy variable usually set the SEZ (special economic zone), OCC (open coastal cities). The empirical work indicates that these policies have a positive effect on inward FDI.

There are other commonly used variables such as domestic investment per worker number of tourists, tax structure, and the special treatment offered to foreign investors, culture, profit rate that may have impacts on FDI inflow. However, such data are either not available or hard to measure.

Table 3-2 the potential determinants of FDI distribution and the Proxy in the former literatures

The potential determinants of FDI distribution	**Proxies**
1. Market demand and market size GDP	GDP; GNP; GDP per capita; GDP growth rate;
2. Infrastructure	Infrastructure GDP per km^2; Highway per km^2; Railway per km^2; Degree of industrialization; Domestic investment; number of telephone sets; numbers of airport
3. Labor quality and the level of scientific research	number of research engineers, scientists and technicians as a percent of the total employees (RSET); R&D expenditures; Number of patents; Number of universities
4. Labor Cost	Average wage
5. agglomeration	Government investment, private sector investment
6. Trade	Total trade amount; Import/GDP; Trade/GDP
7.Industrilized Degree	domestic investment per worker
8.Politics Risk	Politic risk service
9.Policy	promotion expenditures for attracting FDI; the special treatment offered to foreign investors
10.tax	Tax structure
11.financial cost	Domestic interest rate and foreign interest rate; Exchange rate

One interesting phenomenon in China is that more than 80% of FDI stock in the eastern coastal area. The districution of FDI is not balanced between east coastal and west hinterland. Previous studies input the eastern regions as a dummy variable in the specification. Howeover, the determiants of FDI in eastern and western area may have different effect on FDI stock. The effect of location advantage may influence the FDI motivation(Dunning 1981).

3.5 Literature on linkages between FDI and International trade

The key questions on the relationship between FDI and international trade are whether they substitute or complement each other and how does the transportation cost influence behaviour of multinational firms and trade pattern. These questions have been discussed in various trade and FDI models.

The Ricardo Model and H-O model argue that the comparative advantages in technology and factor endowment would stimulate the international trade. A country can increase national income by producing and exporting the products with relative factor abundance resources and production with efficiency. International trade is an alternative approach to reach the equalisation of the factor due to the movement restriction on cross border production input.

The effect of FDI is influenced by the type of FDI. The OLI model the motives for FDI, which are market seeking, research seeking, efficiency seeking, and strategy asset seeking. Nachun (2000) suggests multinational searching the production resource which is not available are home or their disadvantage in home production cost. However, when the resources are immovable, firms may transfer the production to the resource rich countries. Whether the firm will undertake the international trade or international production pattern depends on the mobility of the resource, home production costs and trade costs. The immovable production advantage could be due to the large foreign market for market seeking investment, or the cheaper labour cost for the export-oriented investment, or natural resource.

OLI model determines whether the multinational explore the foreign market through international production or international trade. The model indicates that multinationals will invest overseas if the production cost is relatively lower than the costs of domestic production and foreign exporting.

The results on the relationship between foreign direct investment and trade are mixed. From the previous theories, Dunning (1998) concluded that the linkage between FDI and trade is conditional on the type of trade and FDI. In support, Gray (1998) finds that market seeking FDI display a negative linkage with international trade, on the other hand, efficiency seeking production has a positive linkage with trade.

Type of FDI

Helpman (1984) and Markusen (1984) developed the theories on foreign market access channels in two different directions: vertical FDI and horizontal FDI. Venable (1995, 1996, 1998), Markusen (1998) discloses a complementary relationship between trade and vertical investment. Under the imperfect market condition, factor endowments attract the efficiency-seeking type of FDI. Due to the firm-specific–assets of multinationals, the head-quarters has an advantage in R&D research or a capital intensive goods production. Less developed countries tend to have advantages in the production of homogenous good. To maximize profits, the headquarters of a multinational will be located in the capital abundant countries and specialise in the R&D or other capital intensive goods production and export these capital intensive intermediate goods to labour intensive countries which produce homogenous goods. The international trade of intermediate goods supports vertical FDI development. Much of the intermediate goods trade is carried back and forth to support the downward sector production within the enterprises.

Vertical FDI complements the trade of intermediate goods. Helpman (1984) and Krugman (1984) argue that under the imperfect market conditions, factor endowments attract the efficiency- seeking type of FDI. The factor prices vary from country to country due to factor endowment abundance. To maximize profits, FDI separates the different stages of the production. Headquarters in the capital abundant country is inclined to export capital intensive intermediate goods (R&D) to production subsidiaries in labour abundant regions. The international trade of intermediate goods support vertical FDI development.

Based on the economies of scale, Helpman (1984), Helpman and Krugman (1985) found that even for countries with similar factor endowment, it is still profitable for firms to invest in foreign countries because of economy of scale. This is usually associated with horizontal investment. Marcusen (1998) argues that horizontal FDI takes place if there are similarities in market size and factor endowments. Horizontal FDI (or market-seeking FDI) substitute the international trade of final goods. Horizontal FDI (Markusen 1984) serves the foreign local market through locating the same production activities as the domestic firm in the foreign country, rather than producing the goods in the domestic market and exporting them to the foreign market. There are two types of economies of scale. With the public good characteristics, firm specific asset advantages encourage the expansion of foreign direct investment. However, the fixed cost of a new plant in multi-plant production raises sunk costs. The greater the economies of scale (the greater the size of the business), the more likely to the fixed costs of transnational production are reduced and the higher the attractiveness of FDI relative to exports. In short, a larger market size is important for horizontal investment. Furthermore, high trade barriers will increase the attractiveness of FDI relative to exports.

Trade barriers, market size and factor endowment

Patri (1994) specifies the factor which attracts different types of investment. There are three important factors which influence the production location decision: trade barriers, market size and factor endowments.

Brainard (1993a) explored the proximity and concentration problem with external factor endowments in the general equilibrium model. Proximity to the market refers to the view that a multinational firm locates its production close to the market in order to overcome various trade barriers. The concentration of production indicates that a multinational firm concentrates its production in either the host or home country thereby benefiting from scale economy and serves the foreign market through trade relates. The main benefit of proximity as a market strategy relates to transaction costs. Brainard argues that in the absence of factor endowment differences, the multinational undertakes foreign investment activities through horizontal expansion when proximity advantages dominate the concentration advantages. When concentration advantages are more obvious than proximity advantages, it is more likely that a multinational firm has a single-plant structure. Brainard (1993b) summarized the proximity-concentration hypothesis and the factor endowment hypothesis to consider the FDI structure choice. The FDI decision is shown in Table 3-3.

Table 3-3 Production pattern choice with endowment and proximity/concentration advantage

	Different factor endowment	Similar factor endowment
Proximity	Vertical single plant	Horizontal multi plant
Concentration	Vertical single plant	Single plant + exports

To summarise the theoretical literature relationship to the relationship between FDI and trade: Technique gaps, transportation costs, factor endowments, economies of scale, market demands can influence the decision choice of production location. Vertical FDI accompanied with the intra-industry. The relationship between FDI and trade can either support or replace each other according to the different business intention and strategy.

3.6 The empirical literature concerning FDI in China with Chinese International Trade

There is a volume of empirical work concerning the relationship between trade and FDI including study on Ireland by O’Sullivan, 1993), the US and Sweden by Lipsey and Weiss (1981, 1984), and the OECD countries by Pain and Wakelin (1997). The research of trade and FDI China is limited.

3.6.1 Methodology

The main research approach includes causality test (Liu et al. 2001), OLS (Zhang and Song 2000), GLS random effect (Zhang and Song 2000), cross-section and panel difference GMM approach Yao (2006). Wei et al (2001) examined the interaction between FDI and export and import intensities within a three equation system. The data set includes are 21 source countries[25], which is same as Chinese main trade partners. Liu et al (2001) has investigated the causality relationship between FDI, Chinese import and exports in causality test. The empirical study is based on a panel of bilateral data for China and 19 home countries/regions over the period 1984–1998. Zhang and Song (2000) explored the FDI influence on the regional exports with the panel data cover 28 provinces in the time period of 1986-1997. Yao (2006) has explored the relationship of FDI with influence of export with FDI through a difference GMM approach.

3.6.2 Variables

The main determinants of Chinese international trade include: FDI, domestic investment, GDP, population, exchange rate, geographic factor and time dummy.

FDI is one of the main determinants for Chinese trade factors. In particular efficiency seeking FDI are supported by processing trade. It has a positive coefficient in all previous research. In particular, Wei et al (2001) found that FDI has a positive effect on both import and export intensity. They even found that the effect of FDI on international trade is more obvious than the effect of international trade on FDI.

Labour, GDP and domestic investment are also the important factors for Chinese international trade. The labour effect is ambiguous. Previous research has two proxies for labour effect: skilled labour (Human capital) and unskilled (population). Wei et al (2001) found the increase of the Chinese population. However, Yao (2006) found that the coefficients of both skilled and unskilled labour are not significant. There are two proxies to measure the Chinese economy: GDP value and GDP growth rate. Both of the variables have positive coefficients in previous literature.

The effect of exchange rate is ambiguous. Yao (2006) found the positive effect of exchange rate, which indicates the depreciation of currency have a positive effect on the trade system. However, Zhang and Song (2000) found a negative effect on

[25] The source countries are United States, Canada, Australia, Japan, Germany, Italy, Spain, the United Kingdom, New Zealand, Belgium, Denmark, Finland, France, Netherlands Sweden, Switzerland, Hong Kong, South Korea, Malaysia, Singapore and Thailand.

exchange rate, which indicates that the appreciation of China Yuan support the local exports, it is different with the their expectation as the increase in value of China Yuan, lead a relative higher expense for the foreign customer, which would lead a decrease computation of the export goods with a negative effect on exports.

The geographic effect on Chinese international trade has two focuses. The first one is the Chinese coastal-hinterland effect. This has a positive coefficient in empirical test (Yao 2006). This indicates the coastal provinces have geographic advantages of undertaking international trade, while hinterland provinces have geographic limitation. The second one is geographic distance between China and FDI source country. It contains a negative effect (Wei et al. 2001). This indicates the long distance between China and trade partner impede both bilateral export and import. This indicates the Chinese neighbour, for instance, Japan, South Korea has advantage than the USA and the EU in trading with China. However, Statistics data indicate the main Chinese export market is the USA, the EU and Japan. The first two regions do not have geographic advantage.

3.7 Impact of FDI and Trade on economic growth

The research on FDI and trade spillover effects has developed from three research groups: post-Keynesian (Rosenstein-Rodan 1943, 1961), the new classical growth theory (Solow 1956, 1957, Abramotitz 1956) and endogenous economic growth models (Romer, 1986; King and Robson, 1993; Aghion and Howitt, 1993; Young, 1991; Sala-I-Martin, 1996). The post Keynesian theories emphasize the positive effect of capital accumulation on economic growth under the assumption of a constant return to scale. On the other side, with the assumption diminishing returns to physical capital in the long-run, neo-classical growth theories emphasize the positive effect of technical progress in economic growth. However, one of the problems of neo-classical growth model is that it cannot explain factor effect on the long-run economic development. The new endogenous growth model considers the long term interrelationship between the technology developments, human capital with economic growth. The influx of foreign direct investment brings not only the physical capital but also raises the advanced technology to the host country. Therefore, FDI is considered as an effect to promote the economic development of host countries, especially the developing countries with less advanced technology (Findlay, 1978; Baron, 1990; Ethier and Markusen, 1996). Ethier and Markusen (1996) argued that technical innovations are most effectively copied when there is personal contact between those who already have the knowledge of the innovation and those who eventually adopt it.

The multinational firms influence the economic development of the host countries through various ways. Gőrg and Greenway (2004) summarized four potential channels of productivity spillovers to the host country firms arising from foreign direct investment from previous literatures (Das, 1987; Wang and Bloomstrőm, 1992; Baldwin, 1969; Haacker, 1999; Fosfuri, 2001; Djankov and Hoekmann, 1999; Gőrg and Strobl, 2002; Glass and Saggi, 2002; Aitken et al., 1997; Barrios et al., 2003): imitation, skills acquisition, competition and exports. Imitation indicates location firm develop the new technologies and management skills by through direct learning from multinational firms. Local firms can generate new innovation through reverse engineering. Japan, for example, has adopted this approach. Skill acquisition is a result of technique diffusion through human capital flows associated with multinationals and human capital training. The competition brought by multinationals in the host country can reduce the inefficiencies of the local economy. This can further stimulate local firms to produce at an advantage technology (Leibenstein, 1966). Exports of the multinationals bring a demonstration effect to the local firm for market opening and improving resource allocation The presence of multinational firms not only influences firms in the same industry but also the technology in the upward and downward industries (Rodrigues-Clare 1996).

The exiting literature suggestion two main factors influence the spillover effect of multinational firms to the local economy. One factor is human capital in host countries. Host countries need a minimum stock of human capital to support the development of multinational firms.

The other factor is the technology gap between FDI resource regions and host countries. In general, the spillover is more obvious when technique gap is larger between home and host countries. However, the positive spillover effect of competition is under the assumption of ‘absorptive ability’ of the home country. If local technology does not lag too far behind home country, local firms undertake a catch up process and benefit from the foreign presence (Cantwell 1989, 1995). However, if the local technique level is too far behind the home country, it is impractical for them to benefit substantially technology presence. In this case, multinational firms intend to replace local firm. The capacity of local firm to catch up the technology depends on the level of competitiveness (Perez 1997).

The interaction of multinational firms and level firm lead the spillover effect in a dynamic process. Multinational firms introduce the advantaged technology into the host country. If the technology level increases in host country, the competition will be intense. Therefore, multinational firm have to increase the technology advantages or advantages, for instance, strategies, market skills, to support its market share.

3.8 A survey of empirical works of the influence of FDI and Trade on influence economic growth

3.8.1 Metholodology

Foreign direct investment could not only bring the capital to the host country, but can also stimulate the development of techniques through spillover or diffusion. Although it is widely thought that foreign direct investment plays an important role in Chinese economic development, however, the empirical support is limited.

The mythologies for the research include OLS approach (Graham et al. 2001, Wei et al 2001) cross-sectional approach (Zhang 2001, 2006) and difference GMM approach (Yao 2006). Graham et al. (2001) exam the economic developing factors in six geographic areas in China. The six geographic areas include Northern, Northeastern, Coastal, Southeastern, Southern and Western China. The problem of this research is that it does not include FDI as the explanatory variables, which leak out the effect of FDI in China. Wei et al. (2001) analyse the FDI influence on economic growth. Zhang (2001) applied a cross section and panel analysis concerning the FDI influence on growth. The panel covers 28 Chinese provinces in the time period from 1984 to 1998. For the cross-section data, Zhang (2006) averaged the data into three time periods: which are 1984-1988, 1989-1993, 1994-1998. Zhang (2006) applied the same approach using a larger dataset from 1992 to 2006. Yao (2006) used a panel data covering 28 provinces in the time period 1978-2000.

Graham et al. (2001) explore the economic growth factors of labour, capital and a time trend to capture the total factor production time explanatory factors. Besides the physical and human capital factors, Wei et al. (2001) emphasised the importance of local technique capability related to the economy growth, as the technological capability may lead to product innovation and production imitation. Openness is another factor introduced by the model. Zhang (2006) furthermore noticed the different regional growth rates. A dummy for the eastern coast is included as an explanatory variable. Besides the labour, human capital, capital and FDI, location and trade variables, Yao (2006) emphasise the policy influence by a time dummy during 1992 to 1995. The time dummy indicates the influence of Deng Xiao South tour speech in 1992. Furthermore, Yao (2006) introduced the effect of transportation infrastructure on local economic development.

3.8.2 Variables

Domestic investment

Domestic capital has a positive effect on regional economy growth. Graham et al. (2001) found a positive effect of capital stock in regional economic development in the coastal area, Southern area during the whole time period from 1978 to 1997, and it is positive in North, Northeast and Western area during the time period of 1978 to 1990 and positive in Southeast in time period 1991-1997. Wei et al. (2001), Zhang (2001, 2006) and Yao (2006) found a positive effect of physical capital.

Labour

The effect of labour effect is ambiguous in literature. Graham et al. (2001) proxy population for labour effect and found that labour has positive effect only in the coastal area in time period 1991-1997. The other papers recognize two types of labour: skilled labour and unskilled labour. Wei et al. (2001) found a negative coefficient of population on regional economic growth and human capital has a positive effect. Zhang (2006) and Yao (2006) found that both skilled and unskilled labour have positive coefficients on regional economic growth.

International Trade and FDI

Both international trade (Wei et al. 2001) and foreign direct investment has a positive coefficient. In particular, Zhang (2006) estimation both FDI stock and FDI inflow are variables to capture the long-run and the short-run effect on the regional economy. Both variables have a positive coefficient.

The other variables include technique R&D (Wei et al.,2001), transportation, exchange rate and Xiaoping speech time dummy (Yao, 2006) have a positive effect on regional economic development.

Another dummy variable in previous paper is location variables for the province in the coastal area. However, the results are not consistent. Zhang (2006) found that the eastern coastal location has a positive effect with *t*-statistics of 2.66 and 5.07, both estimation are significant at 95% and 99% confidence level. However, coefficient of location dummy by Yao (2006) insufficiently positive with *t*-statistics of 0.49, which cannot support the location advantages.

The studies have proven that FDI presence stimulate the local economy development in China. Human capital, domestic investment and trade are the other factors with positive effect. This study will include these variables in the estimation model. Zhang (2001, 2006) and Yao (2006) have set coastal area location dummy in the research model, and found the positive coefficient on location influence in the regional development. This chapter will create the location subgroup, and investigate and compare the important factors for between these two subgroups.

However, the impact of FDI and international trade is supposed to be different in two ways. As the eastern and the western provinces are in different stages of development and have different resource endowments. The impact of FDI is limited by the regional initial economic level and supportive resource, such as market competition.

Table 3-4 Empirical Research for inward FDI in China

papers	Data and Methodology	Independent variables	Dependent variables
Liu, Song, Wei, Romilly (1997)	FDI inflow to China from 22 countries 1983-1994 Pool cross section and time series data Obs 264	FDI inflow	Relative ral wage (-) Relative GDP(+) Relative real exchange rate (+) Real imports (+) Real borrowing cost(-) Relative country risk rating(+) Total cultural difference (-) Tot geographic distance (+)
Dees(1998)	FDI inflow from 11 countries to China 1983-1995 Panel analysis fixed effect Obs. 143	FDI stock	Market size-GDP last period(+) Real wage rate last period(-) exchange rate last period (+) Stock of patents last period (+) Export from the home country (+) FDI stock last period(-)
Coughlin and Segev (2000)	provincial of FDI inflow 1990-1997	FDI inflow	Provincial production(+) Average Wage(-) Labour productivity(+) population in SOEs Coastal location(+) Illiteracy rate (-) Higher way (+) Airport staff (+)

Zhang (2000)	US investment to China 1979-1997 Hong Kong investment to China 1977-1997 time data	FDI inflow	Market size (GDP) Labour costs Trade barriers U. S. policy of containing China Political stability Tax incentive
Zhang (2001)	direct investment from Hong Kong and Taiwan 1977-1997 panel data	FDI inflow	Market size (GDP) Economic growth Labour costs Trade barriers FDI inventive (dummy) Political instability(dummy)
Cheng and Kwan (2000)	FDI inflow to 29 Chinese regions 1985-1995 panel	FDI inflow	labour wage(-) infrastructure level(+) per capital income (+) Education level (?) policy designation(+)
Tung and Cho(2001)	FDI inflow in the special economic zones 1988-1994 panel data	FDI stock/ capita	population Infrastructure(+) of tax incentive (dummy) (+)
Sun Tong and Yu (2002)	Panel form 30 provinces 1986-1998	FDI inflow	Market size (GDP) Labour cost domestic investment per work labour quality infrastructure

Fung Iizaka, Lin and Siu (2002)	HK and US direct investment in Chinese regions Panel of random effect	HK direct investment Inflow; US direct investment inflow	GDP(+) Average wage (-) number of student higher education(+) kilometre of road and railway(+) Number of SEZ(+) number of open coastal(+) The number of economic and technological development zone(+)
Ng and Tuan (2003)	manufacturing FD in China in Guangdong province 1998 Obs. 8985 Cross section Firm level data	FDI inflow	Transition cost(+) Firm size(+) trade construction(+)
Wei et al (2001)	21 source countries 1983-1994 Pool cross section and time series data	Export intensity	FDI (+) Population ratio(+) GDP ratio (+) Geographic distance (-)
		Import intensity	FDI (+) Population ration(+) GDP ratio (+) Geographic distance (-)

Liu et al (2001)	causality test for bilateral data for China with 19 regions/countries during Period 1984–1998.	bilateral data Chinese trade with other 19 economics	FDI(+)
Zhang and Song (2000)	Panel of 28 Chinese province in time period of 1986-1997 Panel GLS and POOL OLS	Provincial Chinese exports	regional inward FDI flow (+) domestic investment (+) regional manufactory intensity(-) exchange rate (-) local GDP growth (+)
Yao (2006)	Panel of 28 Chinese province in time period of 1992-1995 difference GMM approach	Provincial Chinese exports	GDP (+) Wages (insignificant) Exchange rate (+) Transport (+) Human capital (insignificant) East coast dummy (+) Time dummy (+) FDI (+)
Graham et al. (2001)	OLS	Regional economy	capital stock (+) in coastal area, Southern area (1978 to 1997); in North, Northeast and Western area (1978 to 1990); in Southeast (1991-1997) ; population (+) in coastal area (1991-1997).

Wei et al. (2001)	OLS, EC model Panel of 27 provinces in 3 time period.	GDP	Physical capital (+) Population (-) Human capital (+) FDI (+) Technology (+) Openness(+)
Zhang (2001, 2006)	28 province in three time periods Cross-section, fixed effect	Growth of domestic economy	Domestic investment (+) Population growth(+) Human capital (+) Location dummy (+) FDI stock(+) FDI flow(+)
Yao (2006)	Panel of 28 Chinese province in time period of 1978-2000 difference GMM approach	Regional GDP	Labour(+) Human capital(+), Capital (+) FDI(+), East location(not significant), trade variables(+), Exchange rate (+) Time dummy during 1992 to 1995(+).

3.9 Conclusion

This chapter has reviewed the theories related to FDI, which includes the determinants of FDI and its impact of international trade and economic development. Furthermore, the chapter has a survey of the empirical research on FDI in China.

The empirical researches on FDI in China are behind the development of modelling. From the methodlogy aspect, most of the previous researches on the national level applied static analysis rather than the dynamic analysis in time series. This might due to the small data size. The researches with panel data applied the static model. All the factor data series are treated as exogenous variables. However, with almost 30 years of development in China, with the increase of data size, it is proper to apply the dynamic research approach to China.

From the specification aspect, the previous research es have not emphasis the geographic location, which may influence the effect of the determiants of FDI and also the effect of FDI on Chinese international trand and economy development. The thesis contributes to fill these empirical gaps.

Chapter 4 The Determinants of Foreign Direct Investment in China: A Time Series Approach

4.1 Introduction

The aim of this chapter is to have an empirical study the determinants of inward FDI in China. Dunning's (1977, 1980 and 1988) summarized five important types of FDI according to their investment motivation, which are market-, natural resource-, efficiency- strategic asset-seeking (Dunning 1988) and trading seeking (Chryssochoidis, Millar & Clegg 1997). According to these motivations, the determinants include location advantages explored by previous paper, which includes market size, production input cost and trade supports (Culem 1988; More, 1993, Pain, 1992; Barrel and Pain, 1996). China is an economy with huge market potential and rich human resource but lack of new/high technology. This type of economy literally attracts multinational firms to set the subsidiaries.

However, the motivations of FDI have been influenced by the geographically location between the home and host countries. Cushman (1986) introduced the geographic influence into FDI location choice. They have investigated how multinational firms balance the market size effect and the transportation cost effect in overseas subsidiaries setting. Concerning the FDI in China, there are two groups of important resource regions: East Asian neighbours and EU/US regions. The different geographic location of groups reflects in the different transportation cost, which influence the motivation of multinational firms to China. All these types FDI are influenced by the transportation cost. This study intends to compare the effect of other determinants with the limitation of investment source region geographical location.

The relevant empirical studies on inward FDI stock in China have not specially discussed the effect difference raised by the location characteristics. One of the contributions of this study is to explore the effect of FDI determinants with concerning the geographic location of resource regions. Besides the investigation of aggregated FDI stocks in China, this study explores the factors which attract FDI from two main source countries: the United States and Japan. A comparison of the results from these two regions aims to explore the geographic effect. The geographic distance is often used as a proxy to measure the transaction cost of international trade, which is expected to influence the entry decision of multinational firms (Brainard, 1993b).

Furthermore, the relevant studies concerning FDI determinants to China suffer from the econometric approach selection. Generally, two approaches have been applied in the empirical studies, which are time series approach and panel approach. Panel approach is not appreciated for Chinese market due to the small data sample. The reasons for small sample size is due to the fact that inward FDI in China is highly concentrated from Hong Kong, USA, Japan, Taiwan, UK, Germany, France and South Korea. More than 86.93% of total inward FDI stock in China is from these regions (Chapter 2, section 2.3). The investment amount from other regions is relatively small and unstable. The number of cross section unit is very small (Wei and Liu, 2001). The estimation results are likely to be biased by small sample size. Therefore, panel research does not suit the research for the Chinese market.

The alternative research approach - time series is not restricted by the FDI source countries. However, most of the previous researches by time series approach on Chinese market enclose not only the short-run relationship but also the long-run relationship. Few empirical researches apply the VAR and VECM approaches for long-run estimation. To ensure the data series are integrated in the same order, previous research limited number of variables. This is because these approaches only allow the variables with same integration order of one.

This study aims to investigate the determinants of FDI in China with the ARDL cointergration approach, which explore not only short-run but also long-run relationship between the variables. Compared with VAR and VECM approaches, the advantage of the ARDL approach is that it could be applied for a mixed integration order of data series, which allows more complicated research models.

The structure of this chapter is as follows: section 4.2 will start with the granger causality test to explore the relationship between the Chinese export, Chinese Economy size and FDI stock in China. Section 4.3 discusses the research model of FDI determinants and the dataset in the empirical work. Section 4.4 reports econometric results using the ARDL approach in aggregate inward FDI to China. Section 4.5 investigates the determinant of FDI from USA and Japan. Section 4.6 will have a discussion of the geographic effect on the determinants of FDI stock in China.

4.2 The Granger Causality test

To test the possible causality hypothesis, the Granger causality test is applied to investigate the plausibility of international trade and Chinese economic drive the FDI stock in China.

Table 4-1 The causality test results of FDI stock in China, Chinese exports and Chinese Economic Size

	FDIS	*GDPC*	*EXPORT*
FDIS		6.71467** (0.0059)	0.14867 (0.8628)
GDPC	0.23670 (0.7914)		1.77765 (0.1947)
EXPORT	0.18960 (0.8288)	2.24189 (0.1323)	

The test used the data in the form of first difference as the variables are stationary in the first difference (Table 4-4). The result indicates the t-stat on the causality hypotheses of the row variable on the column variable.

The results appear that granger causality runs one – way from FDI stock to Chinese economic growth and not the other way round (Table 4-1). The Chinese export and the

Chinese economic growth do not cause the future change of each other. The Chinese export and FDI stock in Chinese does not cause, neither.

However, as the results of the granger causality test on the FDI stock from individual country, bilateral trade and Chinese economy development are different from the aggregate data. For instance, the causality test results of these two countries are different with the aggregate value.

The granger causality runs from Chinese economic growth to Japanese FDI stock in China and also the other way round (Table 4-2). Furthermore, causality runs one way from FDI stock to export and from Chinese economy development to export. This indicates that not only Chinese economy drives the future FDI stock in China, but also the development of Chinese economy causes the future changes of Japanese FDI stock in China. The Japanese FDI stock in China and Chinese economy drive the future Japanese export to China, but not the other way round.

Table 4-2 The causality test results of the Japanese FDI stock in China, bilateral exports and the Chinese Economic size

	FDIS	*GDPC*	*EXPORT*
FDIS		4.57220** (0.0248)	8.06125*** (0.0032)
GDPC	4.14055** (0.0332)		3.54244* (0.0504)
EXPORT	1.90216 (0.1781)	0.91254 (0.4193)	

The test used the data in the form of first difference as the variables are stationary in the first difference (Table 4-4). The result indicates the t-stat on the causality hypotheses of the row variable on the column variable.

The two way causality also appears at US – China dataset. US FDI stock in China drives the future Chinese economic development, and other way round the development of Chinese economy cause the changes of future FDI stock in China (Table 4-3). FDI stock in drives the export from US to China. On the other way round, export causes the future changes of USFDI stock in China. There is only one way causality in this US-China dataset. Export causes the future changes in Chinese economy, but not the other way round.

Table 4-3 The causality test results of the US FDI stock in China, bilateral exports and the Chinese Economic size

	FDIS	*GDPC*	*EXPORT*
FDIS		6.65637***	5.26001**
		(0.0069)	(0.0159)
GDPC	10.0138***		0.07515
	(0.0012)		(0.9279)
EXPORT	3.05005*	9.86901**	
	(0.0723)	(0.0013)	

The test used the data in the form of first difference as the variables are stationary in the first difference (Table 4-4). The result indicates the t-stat on the causality hypotheses of the row variable on the column variable.

Although the causality test only finds one way plausibility of FDI stock drive the Chinese economic development in the aggregate data, there are more two ways causality are founded in the Japan- China, and the United States- Chinese dataset[26]. Therefore, FDI stocks in China, trade, Chinese economic growth are supposed to influence the future changes of the other two variables in these regions. This chapter will have a further discussion the determents of FDI in China, which includes the Chinese market effect (represented by Chinese economy size) and international trade as the explanatory variables.

[26] Japan and the United States are the second and the third largest FDI resource region for China after Hong Kong. They are also the most important trade partner of China (Chapter 2). The main reason is that countries with various investment intentions might offset the effect of these economic factors on the inward FDI in China, as multinationals make the investment decisions based on its own economic environment and Chinese market (Zhang 2000).

4.3 The model and variables

This section is composed of three parts of work. Section 4.3.1 introduces the model specification. Section 4.3.2 discusses the expected effect of variables. Section 4.3.3 discusses the data series selection.

4.3.1 The specification of foreign direct investment

In respect of the main five types of FDI (Chryssochoidis, Millar & Clegg, 1997), market seeking, efficiency seeking and trade related FDI play the most important role in China. Market size is an important factor for market seeking FDI, while production costs are the most important factors for efficiency seeking FDI mostly. Intangible and tangible transportation cost and price gap are important factors for trade-related FDI. The basic research mode of this study includes market size (*D*), international trade (*X*), human and capital costs (*c*, *w*) as the determinant of FDI stock in China (*FDIs*). Previous researches (Pain 1993, Pain and Barrel 1996) include exchange rates to measure the relative price changes between host and home country. Therefore, the proposed function of FDI determinants in this study, following the model by Pain and Barrel (1996) is written as follows:

$$\mathbf{FDIs=f\ (\mathit{D}, \mathit{X}, \mathit{c}, \mathit{w}, \mathit{ex})} \qquad \mathbf{(4\text{-}1)}$$

FDIs is FDI stock in the host country, China; *D* is market demand; *c* is capital cost; *w* is labour cost; *X* is the export from FDI source country to recipient country; *ex* is the exchange rate.

4.3.2 The variables

This section sets out the expected effect of these factors on FDI in China. The explanatory variables include market size, export, labour and capital cost and exchange rate.

Market Size

Multinational firms service global markets, which include home market, host market and third market. In general, market-seeking multinational firms are more inclining to enter in the form of FDI rather than exporting for larger foreign market. Due to the public good characteristics of firm specific assets, multinational firms reap the benefits of scale economies from production expansion as average costs decrease. FDI is a more profitable form in large foreign market (Morre, 1993; Venable 1995, 1996, 1998 1995). Furthermore, the large market supports the product differentiation due to the scale of economy. China is the second largest economy, which provides a large market for global products.

However, multinational firms not only aim to meet host market demand, but also in home market demand (Pain1991; Barrel and Pain1996). Multinational firms arrange production to serve the global market through FDI or final goods exporting. Production of the multinational firm in the host country is influenced not only by the host market demand, but also home market demand. Barrel and Pain (1996) argue that foreign – domestic production ratio depends on the returns on the scale gap between two countries and transportation cost. FDI is stimulated by growth of total market demand.

Market demand is expected to have a positive effect on inward FDI (Kravis and Lipsey, 1982). Pervious empirical work has supported the host market effect in China (Wang and Swain, 1995; Hong and Chen, 2001; and Zhang, 2000). The proxy of market size in the previous literature is measured by GNP or GDP. This empirical study applies the value of aggregate GNP because GNP allocates production based on ownership which could reflect the market demand of home country and host country. The effect of the market demand is expected to be positive.

Exports from home country

The relationship between FDI and trade depends on the production pattern and transportation costs. They have a substitutive relationship in serving the host market for final products and a complementary relationship in intermediate goods exports.

For the final goods production, to avoid higher tariffs, multinational enterprises will enter the foreign market through establishing a factory in the foreign market, although there are extra plant-fixed costs associated with FDI (Moore, 1993). This tariff jumping effect is more obvious in a market with high tariffs and trade barriers.

On the other hand, for the vertical FDI, the tangible intermediate goods from home country support the final good production in FDI recipient countries (Horst, 1972; Jeon, 1992). The intermediate goods exported from home country are supposed to have a positive effect on FDI in China.

In a dynamic scope, exports of both final and intermediate goods raise the possibilities of future foreign direct investment flows. A successful exporting experience supports the multinationals in collecting new market information. These benefits include brand awareness creation in the host market, new market demand recognition and cooperation partners and competitors survey. With the ideal market conditions, a multinational firm can shift production to host areas. Foreign market production benefits multinational in knowledge asset protection (Kogut and Chang, 1996).

Previous empirical researches find the positive effect of export in the Chinese market (Wang and Swain, 1995; Hong and Chen, 2001; and Zhang, 2000). However, according to the analysis above, export from home country can have a complimentary relationship with FDI in dynamic estimation.

Labour cost

Cheaper labour inputs are expected to reduce total production costs, which further raises the investment profit. It is one of the most important factors considered in labour intensive industry, in particular, in manufacturing industry (Dunning 1981, Culem, 1988, More, 1993, Coughlin and Segev, 2000).

Not only the wage level in the host country influences FDI, but also the wage level in home country affects investment decision of multinational firms. A higher wage rate in the home country stimulates outflows of FDI (Braunerhjelm and Svensson 1996). The wage rate is a proxy for human capital quality. A higher wage rate in home country indicates a large ownership advantage. It directly drives multinational to explore new foreign markets.

The wage gap between the home countries and host countries has an impact on the FDI location choice (Culem, 1998). The larger the wage gap between the source and recipient countries, the more attractive the investment is.

In general, the labour cost is found to be an important factor for multinational firms in China (Sun et al., 2002). In particular, more than 60% of inward FDI in China are located in labour intensive manufacturing, which is unskilled labour concentrated. This study applies the wage gap between FDI home country and host country to examine the labour cost effect.

Interest rate

For multinational firm, the effect of the capital cost gap depends on where the multinational firm borrows capital. If multinational firms borrow in the home country, a low interest rate has a positive effect on outflow FDI. If MNEs borrow in the host country, the effect will be the other way round. However, due to the development of world financial markets, multinationals can access capital market globally, even in the third countries. This leads the interest rate effect unclear.

However, interest rate is an index of economic growth. A growing market attracts potential foreign investment inflows. At this point, a high interest rate in China is expected to attract foreign direct investment.

The previous empirical researches find a negative effect of China's interest rate relative to the home countries' interest rate (Wang and Swain, 1995; Hong and Chen, 2001; and Zhang, 2000). This study applies the interest rate gap between China and the FDI source countries to measure the capital cost effect. The proxy of capital cost measured by Pain (1993) is to remove the natural usage depreciation of fixed capital goods[27] in the balance sheet (Plant, Property and Equipment), the market price change of these fixed capital goods, and exchange rate changes. This study will apply this approach.

Exchange rate future movement

Exchange rate can influence FDI in various aspects, which include relative wealth (Froot and Stein, 1991; Klein and Rosengren, 1994), firm specific asset value and relative labour costs (Culem 1988).

Empirically, the exchange rate effect is ambiguous. An appreciation of the foreign currency value indicates profits of foreign subsidiaries increases in terms of the domestic currency, which stimulates foreign investment to shift production into host countries. However, it also indicates the relative labour costs increase in the foreign subsidiaries, which leads to a future production decrease due to higher production costs.

Some previous studies concerning the Chinese market found significant effects on FDI (Fung et al., 2000, Keer et al., 2001), while the other researches did not (Wang and Swain, 1995; Hong and Chen, 2001; and Zhang, 2000). There are two reasons for the insignificant results. Firstly, due to the opposite influence of the exchange rate on FDI, the profit and labour cost effects offset each other. Secondly, China adopted a fixed exchange rate regime during the time period of 1994-2005.The fluctuation of exchange rates is too small to influence FDI.

[27] The foreign investment lists in different financial account in balance sheet. As majority of the investment in China congregates in the manufacture, in this case, we suppose there is a portion of the capital applied into the fixed capital goods account.

In general, the Chinese currency Renminbi (RMB) is considered to be undervalued. A decrease in the RMB value is expected to stimulate FDI inflows (Wei et al., 2001).

Summarising, the expected effects of the independent variables are as below:

$$\text{FDIs} = f\,(\overset{+}{D},\ \overset{+/-}{c_1/c_2},\ \overset{+}{w_1/w_2},\ \overset{+/-}{\Delta ex},\ \overset{+/-}{X}) \qquad \textbf{(4-2)}$$

FDIs is the real FDI stock in China

D denotes the total demand $D_w + D_c$

D_w ,D_c represent home market demand and Chinese market demand

c_w,c_c real capital cost in home countries and China

w_w,w_c real average wage costs in home countries and China

Δex represents one period rate of change in the effective exchange rate

X denotes the exports from FDI home countries to China

4.3.3 Data issues

This section describes the data construction in the empirical work. The sample period covers the annual FDI stocks in China from 1982 to 2008, which captures the rise of FDI to China.

For the estimation, the data series of FDI, GDP, wage and exports are converted into indexes assuming the value in 1982 equal to 100. For example, real FDI to China from USA is 100 million US dollars, while, real GDP is 100 billion US dollars. Then the index value at the beginning is 100.

Furthermore, the indexes are converted into a linear functional in the logarithm form. There are two reasons to make the transformation. Firstly, the influence of an extreme value from a specific year in the data series is reduced. This is because the log linear form reduces the magnitude of data series. Secondly, the transformed data could lead a non-linear relationship into a linear relationship.

FDI stock series

There are two reasons using FDI stocks in this study. First, FDI investment is usually a long-run investment rather than short-run. Secondly, FDI stocks are more stable than FDI flows (Figure 4-1, 4-2, 4-3, 4-4).

The data is from the Chinese Statistics Bureau, in units of million US$. To ensure data series are at a constant price level, the data series was deflated based on consumer price index 1982 value. The logarithm of FDI inward stocks into China at constant prices (*LNFDIs*) is exhibited in Figures 4-1, 4-2. FDI has an upward trend over the last 26 years. In particular, during the period of 1992-1998, there is an accelerated increase.

The world data index composition

Variables of GNP, level and capital cost contain a world value besides the Chinese GNP value. A weighted world index is built to measure the world value of the variables. This study selects Japan, United States, South Korea and United Kingdom as world data base. It is due to several reasons: Firstly, a large volume of inward FDI comes from Greater China regions, which include Hong Kong, Taiwan, Macao and Singapore. However, they do not suit world data index construction. Because of various policies applied to the investor from these regions. For instance, FDI from Hong Kong is subject to a tariff payback policy applied to special investor (Zhang 2000). Also, Euro and Asean countries are not suitable for the world index as the exchange rate is an explanatory variable in the model because the currency cannot cover the whole estimation period, which has been issued since 2002.

Secondly, Japan, South Korea, United Kingdom, United States is ideal countries for our world data index as all these four countries are among the 10 largest FDI source countries in the last 26 years.[28] The investment from these regions influences the whole level of China FDI stock.

Thirdly, these four countries are world leading in terms of world production. These production level, wage and capital of these regions would influence the relative data index of the world.

Fourthly, the index is characterised by the investment geographic diversity. It includes two Asian countries, one American country and one European country.

The weight of each country in the index is according to their GNP values. Hong and Chen (2001), use the FDI portion as the weight. This study creates the world index as the world economy entity rather than the investment entity. In the last 26 years, the GNP of United States in these four countries country contains 56% to 69%, the average weight is 62%. Japan takes 29%. United Kingdom and Korea take 6% and 3%. Annual world GNP, average annual wage and capital cost will be used for world investment index.

Chinese GNP, World GNP and Add-up GNP

Chinese GNP and World GNP data series are proxies to measure Chinese and world market size. The data source of nominal GNP for China, United States, Japan, United Kingdom, and South Korea is from IMF International Financial Statistics in Thomson Reuters DataStream.

To ensure constant prices, the value of GNP through GDP deflator of each country was based on the price level of 1982.

[28] The 10 largest FDI source countries/regions for mainland China is Hong Kong, United States, Taiwan, Japan, Singapore, Virgin Islands, South Korea, United Kingdom, Germany, France. Data source: Chinese Statistic Bureau Year Book.

To cover the unit account gap and smother the data, the data series "Chinese GNP" is the data of the deflated Chinese GNP in the logarithmic form, and then the data is transformed into the index starting in 1982. The initial index value in 1892 equals to 100.

The data series "the world GNP" is constructed by the real GNP of four main countries times the weight index, and then gets the logarithm and transformed into the index with the starting value in 1982 equal to 100.

The data series "GNP" is the sum of real Chinese GNP and world GNP and index with data 1982 equal to 100 and take the logarithm.

The series are plotted in Figure 4-5 to Figure 4-10. LNGNPC is Chinese GNP. LNGNPW is world GNP. LNGNP is the index for the sum of Chinese and world GNP.

Export

The data source of world exports to China is from the Chinese statistics bureau in millions of US dollars. The constant price value of trade is using the GDP deflator based on 1982. The data series takes the logarithm form and index with the value in 1982 equal to 100 (plotted as *LNEXPORT)*.

Exchange rate

Exchange rate is measured as Yuan in terms of US dollars in previous research (Dees 1998, Liu et al.1997, Wei and Liu 2001). However, this chapter proxies the exchange rate of the Chinese currency Renminbi (RMB) in terms of SDR (Special Drawing Rights) for aggregate FDI estimation, which provides an objective measure of the Chinese currency against a basket of currencies. The data source for exchange is the IMF International Financial Statistics. To get the real exchange rate, the nominal rate is multiplied by the price level rate of source country and home country. In this data series, US GDP deflator was applied as the foreign price level for SDR. An increase in variable indicates a depreciation of the Chinese RMB (Yuan).

Unit labour cost gap

The wage gap is measured by the relative wage between the source country and China. The data source of nominal Chinese annual wage is from the Chinese Statistic Bureau Yearbook. The nominal wage of the United States, Japan, United Kingdom and South Korea is from OECD Economic Outlook Database (through DataStream).

The nominal wages were converted to US dollar and deflated by the national GDP deflator based on 1982. The world annual wage is measured by the sum of the wage series of US, JP, UK and SK times the world GDP index.

The wage gap is the difference between Chinese wage and the world annual wage. Due to the large wage gap between world wage level and Chinese wage level, the relative change between the variables are not obvious if the proxy measure is to directly get the difference between these two wages or the difference between the logarithms of wage. Because the high world wage may outweigh the changes of Chinese weight level. In this case, the new wage gap data series can catch the movement in two wage level. The negative wage gap could not take the logarithmic form, which might lead to bias. Therefore, the relative wage was applied by source country level divided by Chinese wage level, the logarithmic form was taken. The results were in Figure *LNWAGE*.

Capital cost gap

The capital cost measure used by Pain (1993) is as below: $C_i = \bar{p}_i(r_i + \delta_i - 100(\Delta_4 \ln(p_i^k / e_i)))$. Pain (1993) chose the short term forward rate and long term bond yield to measure interest rate, the assumed depreciation rate is 10% each year. This research assumes depreciation rate is 10%. However, the forward market of interest rate and exchange rate financial products do not exist. Forward interest is not suitable in this model. Furthermore, the issue of cooperation bond is strictly under the quota regulatory, and does not reflect real market supply and demand, the market is limited.

An alternative approach is to select the lending rate. For the annual dataset, a one lag difference for exchange rate changes and capital good price indexes is more practical. The GDP deflator is a competitive measure for national consumption and investment. Due to limited data, the GDP deflator was applied as the alternative measurement for capital good price index to measure market price changes of fixed capital goods. For the Chinese capital cost, the exchange rate change is omitted as there is no price fluctuation in the exchange rate. The capital cost is explained in Figure *CCOST*.

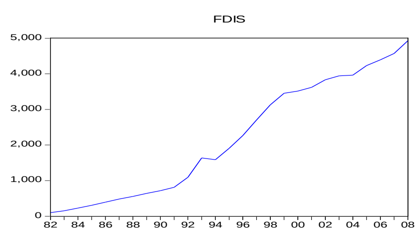


Figure 4-1 The real FDI stock

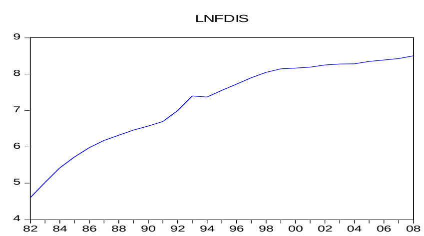


Figure 4-2 The real FDI stock in logarithm

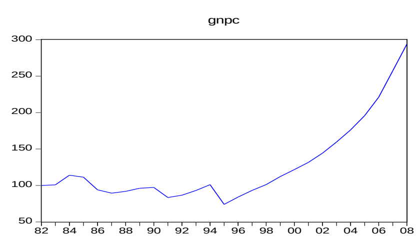


Figure 4-3 The real Chinese annual GNP

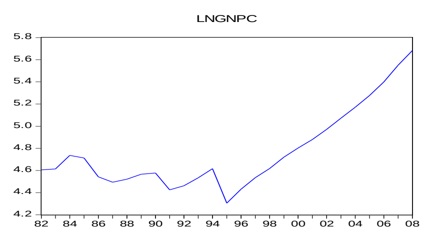
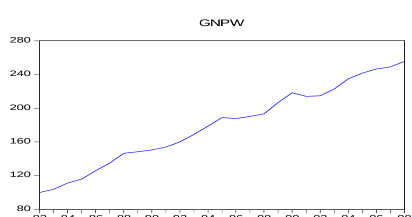


Figure 4-4 The Chinese annual GNP in logarithm



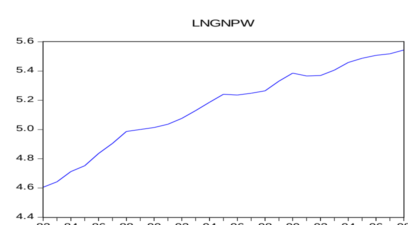
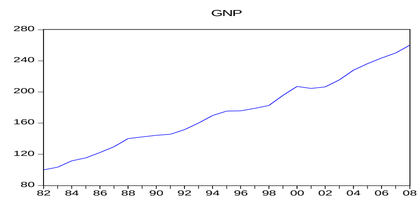


Figure 4-5 The real world annual GNP

Figure 4-6 The real world annual GNP in logarithm



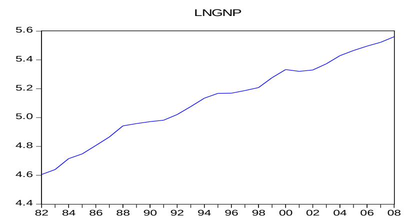
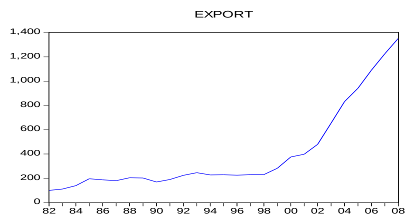


Figure 4-7 The real total GNP

Figure 4-8 The real total GNP in logarithm



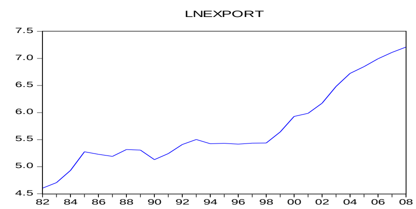
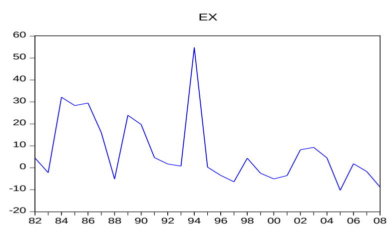


Figure 4-9 The real annual export to China

Figure 4-10 The overall export to China in logarithm



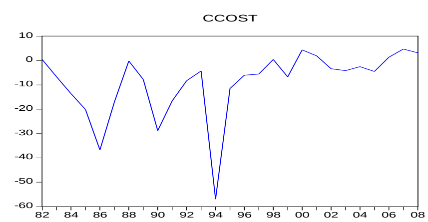
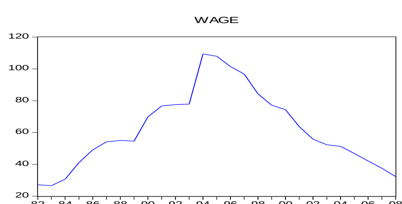


Figure 4-11 The annual average exchange rate

Figure 4-12 The capital cost gap



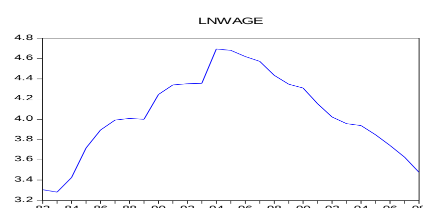


Figure 4-13 The wage gap

Figure 4-14 The wage gap in logarithm

4.4 Econometric methodology

This section has two parts. Section 4.4.1 applies the ADF and PP unit root tests to measure integration order of the data series. Section 4.4.2 discusses the results by the ARDL approach.

4.4.1 unit root and integration

The first step in the econometric process is to test the integration order of each data series. The unit root test results by Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test are reported in Table 4-4*(software*: *Eviews 6*). The data series for FDI inflows, Chinese GNP and total Add-up GNP exhibit stationary attributes in the first difference. The exchange rate changes and the capital cost gap exhibit stationary characteristics in level.

LNFDIS and *LNGNPW* are stationary in levels for the test with a constant (*INPT*) only, but not stationary with both constant and time trend (*INPT+T*). *LNWAGE* is not stationary in first differences with a constant (*INPT*), but stationary with a constant and time trend (*INPT+T*).

Table 4-4 The *t*-value and p-value in ADF and PP unit root test

Variables	*Level*		*First difference*	
(*INPT*)	ADF	PP	ADF	PP
FDIS	-6.1629***	-5.8701***		
	[0.0000]	[0.0001]		
D_W	-4.1437***	-4.3587***		
	[0.0041]	[0.0021]		
D_C	1.6279	2.0668	-4.1064***	-4.1064***
	[0.9992]	[0.9998]	[0.0041]	[0.0041]
D	-2.0970	-2.0945	-4.2163***	-3.63824**
	[0.2475]	[0.2482]	[0.0035]	[0.0122]
EX	-3.9448***	-3.9448***		
	[0.0058]	[0.0058]		
X	0.7814	0.7814	-3.3997**	-3.4056**
	[0.9917]	[0.9917]	[0.0207]	[0.0205]
w_{us}-w_{cn}	-1.2970	-1.4619	-2.6067	-2.60084
	[0.6153]	[0.5365]	[0.1049]	[0.1061]
c_{us}-c_{cn}	-3.6875**	-3.6957**		
	[0.0106]	[0.0104]		
(*INPT+T*)	ADF	PP	ADF	PP
FDIS	-2.1406	-2.1406	-4.1611**	-4.112**
	[0.5007]	[0.5007]	[0.0158]	[0.0176]
D_W	-3.6208	-1.6566	-5.2725***	-4.0051**
	[0.0501]	[0.7414]	[0.0016]	[0.0220]
D_C	-0.2662	0.7518	-5.3254***	-9.8776***
	[0.9873]	[0.9994]	[0.0012]	[0.0000]
D	-3.9319	-2.5645	-4.7824***	-3.8835**
	[0.0257]	[0.2977]	[0.0046]	[0.0284]
EX	-5.0634***	-7.2481***		
	[0.0020]	[0.0000]		
X	-0.5999	-0.5999	-3.8644**	-3.2768**
	[0.9704]	[0.9704]	[0.0303]	[0.0932]
w_{us}-w_{cn}	-0.4780	-0.2891	-4.9438***	-5.1447***
	[0.9781]	[0.9865]	[0.0028]	[0.0018]
c_{us}-c_{cn}	-4.6924***	-5.3199**		
	[0.0047]	[0.0011]		
(none)	ADF	PP	ADF	PP
FDIS	4.6183	2.9083	-2.3395**	-2.3403**
	[1.0000]	[0.9984]	[0.0214]	[0.0214]
D_W	2.5544	5.4852	-1.8541*	-1.7527*
	[0.9960]	[1.0000]	[0.0617]	[0.0757]
D_C	2.0789	2.0789	-3.6786***	-3.6786***
	[0.9887]	[0.9887]	[0.0007]	[0.0007]
D	3.5397	6.8542	-1.0897	-1.3894
	[0.9996]	[1.0000]	[0.2406]	[0.1490]
EX	-3.4448***	-3.4448***		
	[0.0013]	[0.0013]		
X	2.1237	4.1397	-1.7270*	-2.6710***
	[0.9897]	[0.9999]	[0.0796]	[0.0098]
w_{us}-w_{cn}	-0.1054	0.0399	-2.6705***	-2.6640***
	[0.6375]	[0.6866]	[0.0098]	[0.0099]
c_{us}-c_{cn}	-2.8509***	-2.8028***		
	[0.0062]	[0.0070]		

*** indicates the statistic value are significant at the 1%, ** significant at 5%, * significant at 10% and rejection of the null hypothesis of non-stationary [.] indicates the p-value of the statistic results.

Table 4-5 The results of unit root test for LNFDIS data series after first difference

	ADF,PP	
	Coefficient	*t-Statistic*
D(FDIS(-1))	-0.8608***	-4.1611
C	0.2494***	3.1369
TREND(1982)	-0.0094**	-2.5712
R-squared	0.4489	
Adjusted R-squared	0.3988	
S.E. of regression	0.0880	
Sum squared resid	0.1706	
Log likelihood	26.8714	
F-statistic	8.9584	
Prob(F-statistic)	0.0014	
Mean dependent var	-0.0136	
S.D. dependent var	0.1136	
Akaike info criterion	-1.9097	
Schwarz criterion	-1.7634	
Hannan-Quinn criter.	-1.8691	
Durbin-Watson stat	2.0353	

*** indicates the statistic value are significant at the 1%, ** significant at 5%, * significant at 10%.
D(FDIS(-1)) is the first difference form of LNFDS in pervious time period.
TREND(1982) is time trend start from year 1982

Table 4-6 The results of unit root test for LNGNPW data series after first difference

	ADF		PP	
	Coefficient	t-Statistic	Coefficient	t-Statistic
$D(D_W(-1))$	-1.6676***	-5.2725	-0.8305***	-3.9928
$D(D_W(-1),2)$	0.7684***	3.3099		
$D(D_W(-2),2)$	0.5008**	2.6007		
C	0.1020***	4.5661	0.0500***	3.0204
@TREND(1982)	-0.0028***	-3.2841	-0.0014*	-1.8452
R-squared	0.6315		0.4204	
Adjusted R-squared	0.5496		0.3678	
S.E. of regression	0.0214		0.0253	
Sum squared resid	0.0083		0.0141	
Log likelihood	58.5785		58.0402	
F-statistic	7.7112		7.9800	
Prob(F-statistic)	0.0008		0.0025	
Mean dependent var	-0.0006		-0.0005	
S.D. dependent var	0.0319		0.0318	
Akaike info criterion	-4.6590		-4.4032	
Schwarz criterion	-4.4122		-4.2570	
Hannan-Quinn criter.	-4.5969		-4.3626	
Durbin-Watson stat	1.7423		1.8038	

*** indicates the statistic value are significant at the 1%, ** significant at 5%, * significant at 10%
$D(D_W(-1))$ is the first difference form of LNGNPW in pervious time period.
$D(D_W(-1),2)$ and D(LNGNPW(-2),2) is the second difference form of LNGNPW in last two time periods.

Table 4-7 The results of unit root test for LNWAGE data series after first difference

	ADF,PP	
	Coefficient	t-Statistic
D(w_{us}-w_{cn})	-0.9682***	-4.9438
C	0.1978***	3.5484
TREND(1982)	-0.0136***	-3.7701
R-squared	0.5310	
Adjusted R-squared	0.4884	
S.E. of regression	0.0979	
Sum squared resid	0.2109	
Log likelihood	24.2186	
F-statistic	12.4562	
Prob(F-statistic)	0.0002	
Mean dependent var	-0.0050	
S.D. dependent var	0.1369	
Akaike info criterion	-1.6975	
Schwarz criterion	-1.5512	
Hannan-Quinn criter.	-1.6569	
Durbin-Watson stat	2.0243	

*** indicates the statistic value are significant at the 1%, ** significant at 5%, * significant at 10%

D(w_{us}-w_{cn} (-1))is the first difference form of LNWAGE in pervious time period.

In the first difference results of the ADF and PP unit root test in detail with a constant and time trend (*INPT+T*) for *FDIS,* D_w and LNWAGE (Table 4-5, 4-6 and 4-7 report), the coefficients of time trend are significant for all three variables. A time trend exists in these variables. Therefore, the unit root regression with a constant and time trend *(INPT+T)* is superior to the other forms of the test. Data series of *FDIS,* D_W and *LNWAGE* are recognized as *I*(1) variables.

4.4.2 Econometric tests and explanations

The unit root test results indicate that the data series have a mixture of integration orders of *I(0)* and *I(1).*The traditional OLS, VAR and VECM are not suitable approaches in estimating. There are usually two approaches to deal with mixed integration orders. One is to apply the OLS approach with the data series differenced to stationary level (Asteriou and Hall, 2004). The other is to apply the ARDL approach (Pesaran and Pesaran, 1997). To explore the long run effect, this study applies the second approach in the empirical estimation. The estimation result with the OLS short-run relationship is reported in Appendix for reference.

The ARDL approach has several stages. The first step is to test the existence of a long-run relationship (software: *Microfit*). The second step is to estimate the conditional variable with the selected order of the ARDL.

The long-run relationship is recognized through ARDL-OLS regression. The regression conducts an *F*-statistic for the joint significance of the coefficients of the lagged level variables.

Pesaran et al. (1999) suggested an annual data sample with less than two time lags in ARDL long-run estimation. Therefore, two lags is the maximum lag order suitable in the estimation. ARDL model first estimates an OLS regression for the first differences in equation (4-3).

$$\begin{aligned}\Delta \ln FDIs_t &= c + \beta_1 \ln FDIs_{t-1} + \beta_2 \ln D_{t-1} + \beta_3 \ln X_{t-1} + \beta_4 EX_{t-1} \\ &+ \beta_5 \ln(w_w - w_c)_{t-1} + \beta_6 (c_w - c_c)_{t-1} + \sum_{i=1}^{n} \gamma_1 \Delta \ln FDIs_{t-j} + \sum_{j=1}^{m_2} \gamma_2 \Delta \ln D_{t-j} \\ &+ \sum_{j=1}^{m_3} \gamma_3 \Delta \ln X_{t-j} + \sum_{j=1}^{m_4} \gamma_4 \Delta EX_{t-j} + \sum_{j=1}^{m_5} \gamma_5 \Delta \ln(w_w - w_c)_{t-j} + \sum_{j=1}^{m_6} \gamma_6 \Delta(c_w - c_c)_{t-j} + \varepsilon_t\end{aligned} \tag{4-3}$$

The null hypothesis of the *F-Statistic* is that the coefficients of the lagged level variables are zero ($\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$) against the alternative hypothesis of ($\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta 4 \neq \beta 5 \neq \beta 6 \neq 0$), which indicates no long-run relationships between the variables. Table 4-8 reports the results of the *F-statistic* when all variables are jointly considered as dependent variables in ARDL–OLS (first step) regression. There are three versions of the ARDL-OLS model. First regression includes neither intercept nor trend (*None*). The second regression is a regression with an intercept but no trend (*INPT*). The third regression contains intercept and a trend (*INPT +T*).

Table 4-8 The *F*-statistic results of ARDL-OLS estimation

	NONE	INPT	INPT +T
1	3.3622 [.035]	2.7988 [.061]	***6.5669 [.004]***
2	5.6313 [.027]	1.5323 [.328]	5.9606 [.053]

P indicates the maximum lag order. [.] indicates the p-value of the F-statistic results

Table 4-9 The ARDL lag order selection

		NONE	INPT	INPT +T
1	AIC	(1,0,0,0,0,0)	(1,0,0,0,0,0)	***(1,1,1,0,0,1)***
	SBC	(1,0,0,0,0,0)	(1,0,0,0,0,0)	***(1,1,1,0,0,0)***
2	AIC	(2,2,2,2,2,1)	n.a.	(2,0,2,1,2,2)
	SBC	(2,1,2,0,2,2)	n.a.	(2,0,2,1,2,2)

P indicates the maximum lag order. (.) indicates the selected lag order

The results of ARDL-OLS estimation support a long-run relationship among the variables, *LNFDIS, LND, LNX, EX, LN* ($w_w - w_c$) and ($c_w - c_c$). One-lag and twice-lagged variables in the regression. *None* are significant at 95%, and one-lag estimation in the regression *(INPT+T)* is significant at the 99% level, which rejects the null hypothesis of no long-run relationship. Therefore, a maximum one lag estimation of the third version is used, which was selected for the ARDL estimation in the next step (Table 4-8).

As the existence of the long-run relationship has been proved, the second step of the ARDL approach has been taken, which is to estimate the conditional variable with the selected order by Akaike's Information Criteria (AIC) [29] and Schwarz Bayesian Criteria (SBC).

Due to the small sample size, the the estimation with maximum one lag is assumed to be superior to the regression with two lag order. For maximum lag order of one (P = 1), the results of the regression with an intercept and a time trend (INPT+T) are significant at 99% confidence level. The lag choice is selected as (1,1,1,0,0,1) by AIC and (1,1,1,0,0,0) by SBC (Table 4-9).

[29] AIC=Tln|∑| +2N, BSC= Tln|∑| +Nln(T) ,where ∑ is the determinant of the variance/covariance matrix of the residuals, N is the total number of parameter estimated in the equations.

Table 4-10 The results of long-run effect with maximum one lag order

Long run			*Short run*		
FDIS	*Coefficient*	*T-Ratio*	*LNFDIS*	*Coefficient*	*T-Ratio*
D	-8.4109	-1.5622	dD	-0.4748	-0.6082
X	0.3889	0.8985	dX	-0.1241	-0.8398
EX	0.0048	0.8845	dEX	0.0015	0.7958
w_{us}-w_{cn}	1.3493***	2.9240	d(w_{us}-w_{cn})	0.4168***	3.3409
c_{us}-c_{cn}	0.0226*	2.0686	d(c_{us}-c_{cn})	0.0070**	2.8264
INPT	38.1012	1.7126	dINPT	1.7688***	3.4472
T	0.3498**	2.5561	dT	0.1081***	3.8772
			ecm(-1)	-0.3089**	-2.2466
R-Squared			0.8575		
R-Bar-Squared			0.7773		
S.E. of Regression			0.0604		
F-stat			13.7509[.000]		
Mean of Dependent Variable			0.1499		
S.D. of Dependent Variable			0.1281		
Residual Sum of Squares			0.0584		
Equation Log-likelihood			42.3812		
AIC			32.3812		
SBC			26.0907		
DW -statistic			2.0537		

[.] indicates the p-value of the F-statistic result
d indicate the first difference form of variable, ecm indicates error correction term

The estimation results of coefficient and significance level are similar by these two criteria. This study reports the results by SBC. In the long-run estimation, the wage gap and capital cost gap are significantly positive (Table 4-10). GNP, export and exchange rate do not have a significant effect on inward FDI stocks. A positive coefficient of the wage gap indicates that Chinese lower labour cost drives long-run foreign investment into China. Wage gap is significant at 99% confidence level in both criteria. The long-run estimation results found a 1% increase in the wage gap between the world average level and the Chinese level will stimulate the increase of FDI stocks in China by 1.35%. Capital cost gap is significant at 95% confidence level in long run. 1% increase in capital cost gap increase FDI stock in China by 0.023%. It is significant at 99% confidence level in short run. 1% increase in the interest rate gap will increase the FDI stock in China at 0.7%.

The short-run adjustment in conditional ECM regression supports the positive effect of wage and capital cost gap. The coefficient of the correction error term -0.30888 for choice lag (1,1,1,0,0,0) by SBC. The coefficients are significant at 95% confidence level. The R^2 and $\overline{R}^2$ indicate the explanatory variables could explain 81% and 78% of the variables.

The previous estimation used the sum of Chinese GNP and world GNP as the proxy to measure total market demand. The results don't exhibit significant coefficients. This study further discusses home and host market separately. The data series of D_W is proxy for home market effect which D_C measure the host market effect.

Table 4-11 The result of long-run coefficient with maximum one lag order for Chinese market effect

	Long run			*Short run*	
FDIS	*Coefficient*	*T-Ratio*	*FDIS*	*Coefficient*	*T-Ratio*
D_c	0.1264	0.1605	dD_c	0.0483	0.1609
X	-0.1484	-0.5701	dX	-0.0567	-0.5685
EX	0.0020	0.3505	dEX	0.0008	0.3309
w_{us}-w_{cn}	0.6930	1.5347	d(w_{us}-w_{cn})	0.2648	1.2666
c_{us}-c_{cn}	0.0114*	1.7605	d(c_{us}-c_{cn})	0.0044	1.6335
INPT	3.4634	0.7262	dINPT	1.3234	0.7158
T	0.1115***	3.0435	dT	0.0426	1.6171
			ecm(-1)	-0.3821**	-2.5027
R-Squared			0.7588		
R-Bar-Squared			0.6649		
S.E. of Regression			0.0741		
F-stat			8.0873[.000]		
Mean of Dependent Variable			0.1499		
S.D. of Dependent Variable			0.1281		
Residual Sum of Squares			0.0989		
Equation Log-likelihood			35.5395		
AIC			27.5395		
SBC			22.5072		
DW -statistic			1.6242		

[.] indicates the p-value of the F-statistic result
d indicate the first difference form of variable, ecm indicates error correction term

Table 4-12 The results of long-run coefficient with maximum one lag order for world market effect

Long run			*Short run*		
LNFDIS	*Coefficient*	*T-Ratio*	*LNFDIS*	*Coefficient*	*T-Ratio*
D_w	-8.1652	-1.6576	dD_w	-0.3370	-0.4533
X	0.4852	1.1708	dX	-0.1288	-0.9065
EX	0.0044	0.8976	dEX	0.0014	0.8081
w_{us}-w_{cn}	1.9671**	2.6839	d(w_{us}-w_{cn})	0.6479***	4.3000
c_{us}-c_{cn}	0.0343	2.3815	d(c_{us}-c_{cn})	0.0089***	3.5896
			dINPT	11.3491***	4.0077
			dT	0.1082***	4.4012
			ecm(-1)	-0.3294**	-2.3078
R-Squared			0.8863		
R-Bar-Squared			0.8105		
S.E. of Regression			0.0557		
F-stat			16.7039[.000]		
Mean of Dependent Variable			0.1499		
S.D. of Dependent Variable			0.1281		
Residual Sum of Squares			0.0466		
Equation Log-likelihood			45.3193		
AIC			34.3193		
SBC			27.3997		
DW -statistic			2.4060		

[.] indicates the p-value of the F-statistic result
d indicate the first difference form of variable, ecm indicates error correction term

For the Chinese market effect estimation, the ARDL model with maximum one lag in the third version and with maximum lag two in the first version have a significant effect in 5% level. Therefore, the factors have long-run integration (Appendix Table A4-6). Due to the small sample size of this result, the results with one lag estimation are more efficient than the results with two lag. The lag choice for individual variables are selected as *(1,0,0,0,0,0)* by SBC. For the world market effect, in the estimation for source country with the rest of the variables, the results of the ARDL model are significant at 95% in most of the cases. The regression *INPT+T* with maximum one lag in is significant at 99% (Appendix Table A4-6). SBC chooses the same lag distribution *(1,0,0,0,0,0)* with intercept and time trend (*INPT+T*) (Appendix Table 4-6).

However, both the long-run estimation and short-run regression do not support Chinese domestic market size effect on FDI stock in China. The world market effect and the international trade do not have significant effect on FDI stock in China, neither. The results are different with previous research (Chapter 3). It supports the previous granger causality test in section 4.2.

The mixed type of the investors might be the reason for these insignificant coefficients, because countries with various investment intentions might offset the effect of these economic factors on the inward FDI in China, as multinationals make the investment decisions based on its own economic environment and Chinese market (Zhang 2000). The causality test proved that the effect of international trade and Chinese market effect are significant on the FDI from Japan and the United States. Therefore, this study continues to research inward FDI from United States and Japan, these two main source countries.

Labour and capital cost gaps exhibit positive coefficients on FDI stock in both short-run and long-run estimation, which indicates factor price gap simulates multinational firm to invest in China.

4.5 Investment from the United States and Japan and country characteristics

Two countries are selected for the country-pair estimations: the United States - China and Japan-China. There are two reasons to select these two economies as country pair samples. Firstly, the United States and Japan are the most important FDI source regions of China after Hong Kong. The inward FDI sources in China concentrate from a few economies, Japan and the United States, the second and third largest FDI source economy (Chapter 2). Although the Greater China regions, such as Hong Kong and Taiwan are important FDI source regions of China, they access to the special treatment, which are not suitable to analysis the geographic effect.

Secondly, the economic characteristics of these two countries are similar. The similarity of economic characteristics reflects in four aspects: Firstly, the investment flows to China is similar in the past 30 years (Figure 4-15, 4-16). Secondly, both of them are the world leading economies. The economic size are close to each other. According to the IMF, the U.S. and Japan are the second and third largest regions as measured by GNP in 2009[30]. Thirdly, both of the countries are important trade partners of mainland China. The U.S, after the European Union, is the second biggest trade partner to China during 2005-2008, the bilateral trade volume in 2008 is about 13.0% of total Chinese international trade (Chinese Statistics Bureau, annual FDI reports) Japan used to be the biggest trade partner to China in the 1990s, but now it is the third biggest trade partner after EU and U.S., the bilateral trade column is about 10.4% of total foreign trade of China in 2008 (Chinese Customs Statistics). Finally, the amount of FDI inflows and stocks from these countries to China grew at a similar level since 1984 (Figure 4-15, 4-16).

Thirdly, these two regions have different geographic location, which support the geographic effect research. Japan and China are both located in East Asia. The distance between the two capital cities is only 2478 kilometres. However, the USA is far away from China, the distance between the capital cities is 11, 100 km. Literature recognizes distance as a determinant factor of investment decision by multinational firms (Solocha and Soskin, 1990, 1994; Davidsons1980, Venable 1996), which directly raises the information cost, monitory cost and transportation cost of subsidiaries in the host country. It reduced the profit by export-oriented investment, but has less influence on market orientated investment. The location of these source regions is supposed to influence the investment type. However, the literature did not find significant coefficient for the geographic effect of inward FDI in China (Wei and Liu, 2001). This study does not include the geographic effect as a dummy variable in the model directly, but selects two regions as the investment observation group to compare the effect of the

[30] Ranked by International Monetary fund (IMF), with dataset: international financial statistics.

other determinants of FDI from these two economies with similar economic background to catch the geographic effect.

Figure 4-15 The nominal FDI flows from Japan and United States 1984 -2008

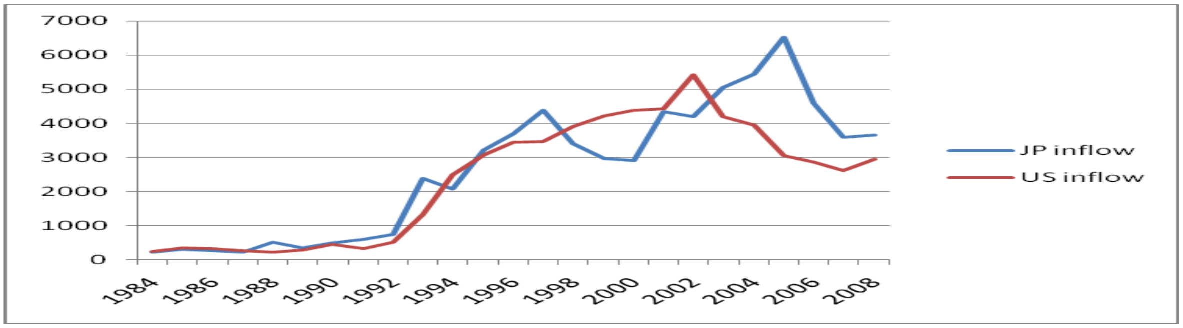
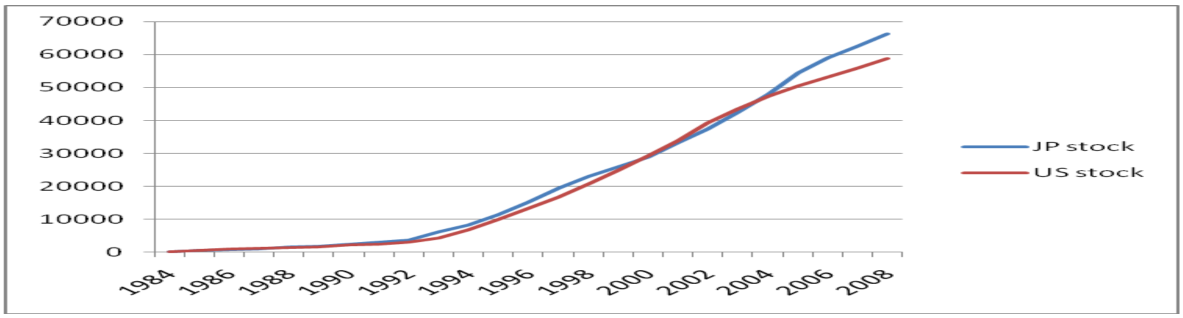


Figure 4-16 The nominal FDI stocks from Japan and United States 1984 -2008



An issue is the exchange rate regime. Although Japan is close to China geographically, the influence of the Japanese Yen in Asia is less than the US dollar. Goldberg and Klein (1997) point out that many Southeast Asia countries (Indonesia, Malaysia, Philippines and Thailand) pegged to the US dollar rather than the Japanese Yen. Therefore, Chinese RMB to US dollar is under the fixed exchange rate regime while Japanese Yen floats against the major currencies. The Japanese exchange rate is supposed to have no effect on the US – China pair but has a positive effect in Japan-China as the increase of the Japanese Yen stimulates the flows into China.

4.5.1 Econometric tests and explanations for FDI from U.S.

4.5.1.1 unit root test

The estimation model (equation 4-2) in section 4.4 for the world- China FDI stock is applied in the US-China country pair estimations with some adjustments.

$$\mathbf{FDIs} = \mathbf{f}\,(\overset{+}{\mathbf{D}},\ \overset{+/-}{c_{us}/c_{cn}},\ \overset{+}{w_{us}/w_{cn}},\ \overset{+/-}{\Delta ex},\ \overset{+/-}{X}) \qquad \textbf{(4-3)}$$

FDIs is the real FDI stock from the United States in China

D denotes the total demand $D_{us} + D_c$

D_{us} ,D_{cn} represent the US market demand and Chinese market demand

c_{us},c_{cn} real capital cost in the US and China

w_{us},w_{cn} real average wage costs in in the US and China

Δex represents one period rate of change in the effective exchange rate

X denotes the exports from FDI the US to China

The US-China sample is for the period from 1984 till 2008. For the country pair analysis, the world level data series of GNP, the wage gap, and capital cost in equation 4-2 is replaced with the United States data. The FDI stocks, FDI inflows, exports, exchange rate variables are US-China bilateral data rather than between the world and China. All series are rebased to let 1984 equal to 100.

Figure 4-17 to Figure 4-28 plot the data series. The ADF and PP unit root tests found that the data series has three integration orders (Table 4-13). The sum of Chinese GNP and US GNP has two unit roots. FDI stocks, FDI inflows, Chinese GNP, US export to China, and wage gap are stationary at first difference. Bilateral exchange rate and capital good are stationary at level.

As the null hypothesis of ADP and PP unit root tests could not be rejected until the results are sufficient against it, ADF and PP test might fail to reject the unit root hypothesis due to lack of informative results to against it. An alternative estimation approach for unit root testing in time series is the KPSS test (Denis Kwiatkowski, Peter C.B. Phillips, Peter Schmidt and Yongcheol Shin, 1992). Different with the other unit root tests, the null hypothesis of the KPSS test is that an observable series is stationary around a deterministic trend or specific intercept[31]. The test aims to distinguish series that appear to be stationary, series that appear to have a unit root, and series for which the data (or the tests) are not sufficiently informative to be sure whether they are stationary or integrated.

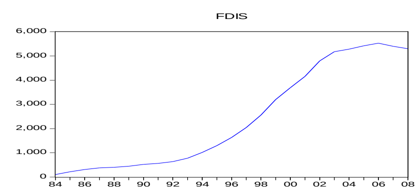


Figure 4-17 The real FDI stock from US

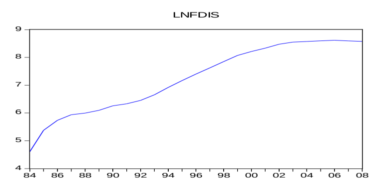


Figure 4-18 The FDI stock from US in logarithm

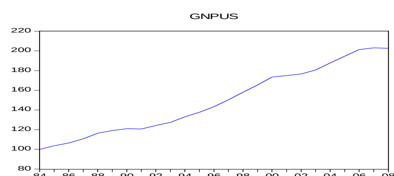


Figure 4-19 The US annual GNP

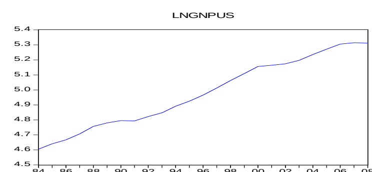
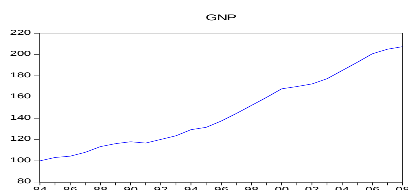
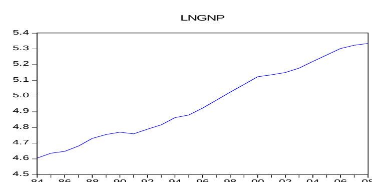


Figure 4-20 The US GNP in logarithm

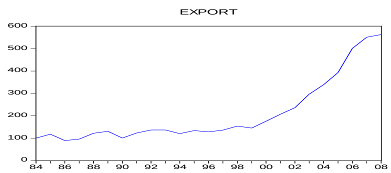




[31] The LM estimation model is $y_t = \xi t + r_t + \varepsilon_t$, where t is the determinant trend, r_t is the random walk, here $r_t = r_{t-1} + u_t$, where $u_t \sim$ iid $(0,\sigma^2)$,ε_t is the stationary error. The null hypothesis of a stationary data series indicates σ^2 should equal to 0, as ε_t is assumed to be stationary. If ζ=0, then the null hypothesis is that y_t is stationary around r_0, r_0 is the fixed incept. If $\zeta \neq 0$, then the null hypothesis is y_t is trend stationary.

Figure 4-21 The total GNP

Figure 4-22 The total GNP in logarithm



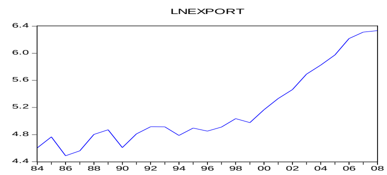
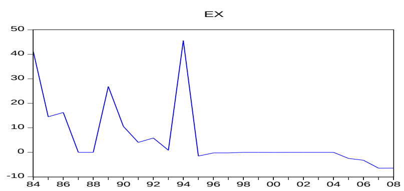


Figure 4-23 The annual US export to China

Figure 4-24 The US export to China in logarithm



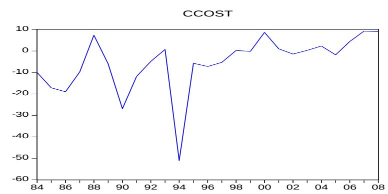
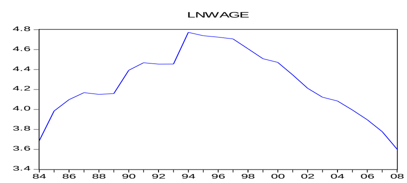


Figure 4-25 The US-China bilateral exchange rate

Figure 4-26 The capital cost gap



igure 4-27 The US-China real wage gap

Figure 4-28 The wage gap in logarithm

Table 4-13 unit root estimation inward FDI from the United States

Variables	*level*		*First difference*		*Second difference*	
(INPT)	ADF	PP	ADF	PP	ADF	PP
FDIS	-3.4329**	-3.1960**	-6.0183***	-4.7290***		
	0.0219	0.0328	0.0001	0.0011		
D_{us}	-1.0222	-0.9461	-2.2454	-2.3754	-3.9737***	-4.8641***
	0.7275	0.7552	0.1969	0.1591	0.0070	0.0009
D_C	1.6344	5.1076	-3.8095***	-1.6291		
	0.9992	1.0000	0.0088	0.4523		
D	0.3236	0.2394	-3.1513**	-3.1514**	-4.5413***	-5.8572***
	0.9746	0.9694	0.0366	0.0366	0.0021	0.0001
EX	-4.8086***	-4.8086***				
	0.0008	0.0008				
X	0.8826	2.7305	-4.9718***	-4.9797***		
	0.9934	1.0000	0.0006	0.0006		
w_{us}-w_{cn}	-0.7789	-1.1031	-3.3524**	-3.3323**		
	0.8034	0.6974	0.0240	0.0250		
c_{us}-c_{cn}	-3.7079**	-3.7079**				
	0.0107	0.0107				
(INPT + T)	ADF	PP	ADF	PP	ADF	PP
FDIS	0.0602	-2.1073	-5.4673***	-4.7999***		
	0.9943	0.5161	0.0019	0.0044		
D_{us}	-2.2926	-1.6139	-2.2826	-2.3968	-3.8551**	-4.8787**
	0.4211	0.7569	0.4260	0.3713	0.0347	0.0040
D_C	-1.0004	8.3869	-4.8438	-4.5075		
	0.9251	1.0000	0.0047	0.0082		
D	-2.5007	-1.9247	-3.0604	-3.0604	-4.3956**	-5.7863***
	0.3246	0.6107	0.1386	0.1386	0.0122	0.0006
EX	-6.1053***	-11.3194***				
	0.0002	0.0000				
X	-1.2466	-0.8923	-5.9932***	-5.5986***		
	0.8768	0.9406	0.0003	0.0008		
w_{us}-w_{cn}	-1.1676	-1.1469	-5.0583***			
	0.8946	0.8989	0.0025			
c_{us}-c_{cn}	-4.9478***	-5.0069***				
	0.0030	0.0026				
(none)	ADF	PP	ADF	PP	ADF	PP
FDIS	2.4243	2.9151	-5.2596***	-4.0691***		
	0.9946	0.9983	0.0000	0.0003		
D_{us}	1.6759	6.8810	-1.3752	-1.3752	-3.9920***	-4.9485***
	0.9733	1.0000	0.1524	0.1524	0.0004	0.0000
D_C	1.8654	3.1764	-3.4491	-1.0887		
	0.9819	0.9991	0.0014	0.2418		
D	9.1123	8.0182	-1.4543	-1.4543	-4.6894***	-6.0046***
	1.0000	1.0000	0.1327	0.1327	0.0001	0.0000
EX	-4.6265***	-4.6265***				
	0.0001	0.0001				
X	2.5879	2.7088	-0.1633	-4.1693***		
	0.9963	0.9972	0.6147	0.0002		
w_{us}-w_{cn}	-1.4373	-0.58401	-3.4054***	-3.3921***		
	0.1362	0.4537	0.0016	0.0016		
c_{us}-c_{cn}	-3.4234***	-3.4234***				
	0.0015	0.0015				

*** significant at the 1%, ** significant at 5%, * significant at 10%

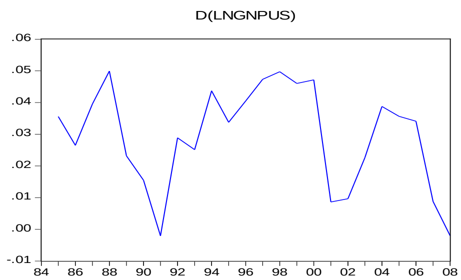


Figure 4-29 The US GNP in first difference

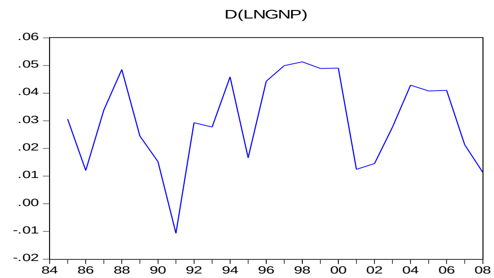


Figure 4-30 The total GNP in first difference

Although the plot of *LNGNPUS* and *LNGNP* indicates the data series are stationary at first different, the ADF and PP unit root tests indicate the first difference form of data series are not stationary. However, data series appears stationary in first difference by observation plot (Figure 4-29, 4-30). The KPSS tests are applied as the complementary test (Table 4-14, Table 4-15).

Table 4-14 The KPSS unit root estimation results on LNGNPUS

		LNGNPUS INPT	*LNGNPUS INPT+T*	*D(LNGNPUS) INPT*	*D(LNGNPUS) INPT+T*
KPSS value		0.729107	0.082533	0.132960	0.094493
critical values:*	1% level	0.739000	0.216000	0.739000	0.216000
	5% level	0.463000	0.146000	0.463000	0.146000
	10% level	0.347000	0.119000	0.347000	0.119000

D(LNGNPUS) indicate the first difference of LNGNPUS

Table 4-15 The KPSS unit root estimation results on LNGNP

		LNGNP INPT	*LNGNP INPT+T*	*D(LNGNP) INPT*	*D(LNGNP) INPT+T*
KPSS value		0.728268	0.129547	0.120746	0.088046
critical values:*	1% level	0.739000	0.216000	0.739000	0.216000
	5% level	0.463000	0.146000	0.463000	0.146000
	10% level	0.347000	0.119000	0.347000	0.119000

D(LNGNP) indicate the first difference of LNGNP

For the first difference of the series *LNGNP*, the statistic value is less than the critical value in 99%, 95% and 90%. The null hypothesis cannot be rejected. This indicates *LNGNPUS* and *LNGNP* series are stationary in first difference with integration order of one.

4.5.1.2 Short-run and long-run effect by the ARDL approach

For the estimation group with total GNP, the estimation results by the ARDL approach indicate a long-run relationship exist between the variables, as *F*-statistics is stationary at the 90% confidence level. For the models with a maximum one lag estimation, the F-statistic results are significant at 99% (the first three columns in Appendix Table A4-8). Due to the small sample size, a maximum of one lag order is chosen. The lag order selection results by AIC and SBC for each model are set (the first three columns in Appendix Table A4-9).

To explore the home market effect and the host market effect separately, Chinese GNP and U.S. GNP are adopted into the estimation models. The results with one lag estimation with Chinese market effect are supported by AIC and SBC (columns 4-6 in Appendix Table A4-8). Long-run relationship has been recognized in ARDL-OLS estimation by F-statistics. The SBC selects the form of *(1,0,0,1,0,0)* for the short run and long run effect estimation (columns 4-6 in Appendix Table A4-8). The lag distribution *(1,0,0,1,0,0)* is selected by SBC (last three columns Appendix Table A4-9) for US home market effect model.

Table 4-16 The results of the determinants of USA FDI in China

FDI_s	*Long run*	*Short run*	*Long run*	*Short run*	*Long run*	*Short run*
D	6.4073*** [8.7712]	3.1335** [3.8504]				
D_{us}					5.9724*** [12.7003]	3.9687*** [4.5474]
D_{cn}			7.7042* [2.2309]	1.0718*** [2.9529]		
X	-0.7732** [-2.2108]	-0.3781** [-2.4172]	-2.6234 [-1.2116]	-0.3650** [-2.0141]	-0.5234** [-2.2947]	0.3478* [2.2994]
EX	0.0088 [0.7584]	0.0009 [0.2412]	0.0642 [1.0514]	0.0028 [0.6750]	0.0035 [0.7315]	0.0023 [0.7344]
w_{us}-w_{cn}	0.2529 [0.9871]	0.1237 [0.8865]	4.5537*** [3.2509]	0.6335** [2.4102]	0.0812 [0.4139]	0.0540 [0.4057]
c_{us}-c_{cn}	0.0015 [0.2240]	0.0007 [0.2245]	0.0466 [1.3394]	0.0065 [1.5464]	0.0037 [0.8112]	0.0024 [0.8380]
INPT	-21.4565*** [-12.2695]	-10.4933*** [-3.4992]	-33.5247*** [-2.9710]	-4.6641** [-2.3067]	20.0411*** [17.4151]	13.3176*** [4.2377]
Ecm(-1)		-0.4891*** [-3.6544]		-0.1391* [-1.8820]		0.6645*** [4.8762]
R-Squared		0.7719	0.7156		0.7605	
R-Bar-Squared		0.6721	0.5911		0.6759	
S.E. of Regression		0.0930	0.1038		0.0925	
F-stat		9.0248[.000]	6.7090[.001]		8.9949[.000]	
Mean of Dependent Variable		0.1654	0.1654		0.1654	
S.D. of Dependent Variable		0.1624	0.1624		0.1624	
Residual Sum of Squares		0.1384	0.1725		0.1453	
Equation Log-likelihood		27.8176	25.1687		27.2296	
AIC		19.8176	17.1687		20.2296	
SBC		15.1054	12.4564		16.1064	
DW -statistic		0.85845	1.0181		0.7655	

[.] indicates the t-value of the F-statistic result , ecm indicates error correction term

As the causality test recognize the influence of market effect on US FDI into China, the market demand D_{cn} are supposed to have significant results. The ARDL-VECM results indicate the market effect (D measured by GNP) has both long run and short run effect on FDI stocks. In long run GNP is significant at 99% confidence level. A 1% increase in total GNP will stimulate FDI stock from U.S. in China 6.4073% (the first column, Table 4-16). The result with Chinese (host) market effect (D_{cn}) has a positive effect of Chinese market effect Chinese GNP is significant at 95% confidence level. A 1% increase in Chinese GNP would lead FDI increase by 7.70%. This indicates that the positive Chinese market attracts the investment to China. The result with U.S. (home) market effect (D_{us}) has a positive effect on investment from US to China at the 99% significance level. A 1% increase in home market stimulates FDI by 5.98%. Comparing the coefficients of the Chinese market, export and wage effect, the market size is the most important factor. The results support previous causality test, and also consistent with previous research, that the growth of Chinese market would attract more foreign direct investment into China. Furthermore, the results found the home market has positive effect on the US FDI stock into China. To optimize the production profit, more foreign direct investment would flow to China with the development of US market.

Both the host market size and home market size stimulate U.S. multinational enterprises to invest in China. The coefficient of the market effect is more important than the rest of the factors. The most important type of investment from U.S. firm is market seeking. The host market effect has a positive effect, as the expanding of the Chinese market size is supposed to increase the market demand of the products, which motivates market seeking FDI.

Chinese national income influences FDI stocks in two aspects: the market size effect and higher priced products. Imamura (1999) argues that multinationals target families with annual income over RMB 30,000 as their target consumers. In 1995, this group contains only 1% of Chinese families. Considering the price level effect, the target group increase in

China increase with the development of the Chinese economy (Table 4-17)[32]. It further stimulates the investment from the United States. Furthermore, the income gap between rich and poor families has increased rapidly in the last 30 years (Table 4-18). The number of higher income families, which are capable of affording luxury products has increased. For instance, the number of luxury products, such as automobile and pianos in top 10% of high income families is 30 times that of the lowest 10% families. Therefore, the increases of both market size and product variety in China simulate investment from foreign multinational firms.

Furthermore, the expansion of the US home market stimulates investment to China. Pain and Barrel (1996) argue that multinational firms consider the global cost and market demand, and figure the optimal production arranges. Considering the scale of economy and the large wage gap, multinational firms may re-export back the products from China to home market although the exporting cost is relatively higher.

Table 4-17 Ownership of Major Durable Consumer Goods per 100 Urban Households at Year-end

Item	*1990*	*1995*	*2000*	*2005*	*2008*	*2009*
Motorcycle (unit)	1.94	6.29	18.80	25.00	21.39	22.40
Washing Machine (set)	78.41	88.97	90.50	95.51	94.65	96.01
Refrigerator (set)	42.33	66.22	80.10	90.72	93.63	95.35
Color Televersion Set (set)	59.04	89.79	116.60	134.80	132.89	135.65
Hi-Fi Stereo Component System (set)		10.52	22.20	28.79	27.43	28.21
Camera (set)	19.22	30.56	38.40	46.94	39.11	41.68
Air Conditioner (set)	0.34	8.09	30.80	80.67	100.28	106.84
Water Heater for Shower (set)		30.05	49.10	72.65	80.65	83.39
Computer (set)			9.70	41.52	59.26	65.74
Video Camera (set)			1.30	4.32	7.12	7.77
Microwave Oven (set)			17.60	47.61	54.57	57.18
Health Equipment (set)			3.50	4.68	3.95	4.13
Mobile Telephone (set)			19.50	137.00	172.02	181.04
Telephone (set)				94.40	82.01	81.86
Automobile (unit)			0.50	3.37	8.83	10.89

Data source: Chinese statistics year book (2010)

[32] The table indicates that the purchasing power of a family has changed considerably in the last 20 years. More and more family could afford luxury goods, such are computer, video camera, health equipment, air condition.

Table 4-18 Ownership of Durable Consumer Goods Per 100 Urban Households at Year-end by Level of Income (2009)

Item	*Average*	*Lowest Income (10%)*	*Low Income (10%)*	*Lower Middle Income (20%)*	*Middle Income (20%)*	*Upper Middle Income (20%)*	*High Income (10%)*	*Highest Income (10%)*	*Highest Income/ Lowest Income*
Motorcycle (unit)	22.40	18.79	23.41	26.43	24.24	22.53	19.24	15.38	0.82
Hand Car (unit)	25.73	18.00	24.86	26.20	27.94	27.63	26.13	24.97	1.39
Automobile (unit)	10.89	1.21	2.15	4.15	7.43	13.63	20.15	38.11	31.50
Washing Machine (unit)	96.01	85.47	91.61	94.82	97.10	98.78	100.42	102.39	1.20
Refrigerator (unit)	95.35	75.44	86.83	94.08	97.28	100.43	103.43	106.42	1.41
Color Televersion Set (set)	135.65	111.25	120.94	125.88	133.54	143.37	154.97	168.75	1.52
Computer (set)	65.74	25.57	41.83	54.51	66.18	78.16	89.41	109.79	4.29
Hi-Fi Stereo Component System (set)	28.21	12.82	19.07	23.28	27.13	32.75	38.48	48.28	3.77
Video Camera (set)	7.77	0.69	2.10	3.41	6.41	10.38	14.27	22.21	32.19
Camera (set)	41.68	10.66	18.71	28.77	38.95	53.06	66.88	85.82	8.05
Piano (set)	2.47	0.19	0.39	1.16	1.88	3.27	4.63	7.54	39.68
Other Medium and High Grade Musical Instrument (unit)	4.65	1.12	2.09	3.58	4.64	6.12	7.06	8.21	7.33
Microwave Oven (unit)	57.18	23.17	36.52	47.79	59.23	70.58	77.04	85.45	3.69
Air Conditioner (unit)	106.84	35.62	60.03	79.27	101.63	130.28	159.04	206.03	5.78
Water Heater for Shower (unit)	83.39	52.50	68.14	77.22	86.29	92.59	98.89	106.43	2.03
Disinfection Cupboard (unit)	18.72	7.21	11.26	13.31	17.04	22.25	28.07	38.09	5.28
Dishwasher (unit)	0.81	0.26	0.46	0.48	0.72	0.83	1.20	2.29	8.81
Health Equipment (unit)	4.13	0.45	1.41	1.76	2.82	5.27	8.49	12.29	27.31
Fixed Telephone (unit)	81.86	66.93	73.96	77.99	82.17	87.14	90.63	94.80	1.42
Mobile Telephone (unit)	181.04	129.54	157.84	174.75	184.52	194.50	205.52	216.41	1.67

Data source: Chinese statistics year book (2010)

The causality test recognizes the export from US to China will influence the future US FDI stock in China. The effect of export is supposed to be significant. With a negative effect is only significant at 95% (table 4-16). A 1% increase in exports from the US to China decreases FDI by 0.77318%. It indicates that there is a substitutive relationship between bilateral trades with investment in China.

The results of export are same as expectation. Export has a substitute effect on investment due to higher trading costs. This result is also supported by Zhang (2001), who found a positive relationship between trade tariffs and inward FDI in China. Higher trade costs discourage the final export to China. FDI is an alternative approach to reach the Chinese market.

The negative coefficient of export confirm that the investment from the U.S.A is more inclined to be market oriented. The main reason is the high transportation cost. The geographic distance raises the exporting cost from USA to China. Therefore, FDI substitutes trade to serve the Chinese market (Braindard 1993).

The price advantage exchange rate and capital cost gap are not significant. But the lower labour costs in China still attract foreign investment from the United States. In long run wage gap is significant at the 99% level. The results are same as previous research. The wage gap is supposed to be an important factor to attract the foreign capitals by Wei (2001).

The cheaper Chinese labour is expected to attract investment from US firms into China due to lower production cost. However, the wage effect does not have a significant value coefficient. It is due to two reasons: Firstly, the transportation cost based on geographic distance dilutes the effect of the wage gap on production cost efficiency (Brainard 1997). Secondly, global income uniformities for technical experts and senior managers reduce the wage gap as the production process consumes less technical experts and managers than the innovation stage. However, the salary expense of these senior staff takes a big portion of total labour expanses in multinational firms (Wang 1994, Imamura 1999). Although recently the management teams in multinational enterprises are localised, expenses on professional managers and technical experts remain high due to global income uniformities.

The interest rate gap does not have a significant coefficient. There is no significant relationship between the exchange rate and inward FDI. This may due to the Chinese exchange rate regime which was pegged to US dollar till 2005.

4.5.2 Econometric tests and explanations for FDI from Japan

4.5.2.1 Unit root test

The adjusted model (equation 4-2) in section 4.5.2 for Japan-China country pair is as below:

$$\mathbf{M = f\,(\overset{+}{FDIs},\ \overset{+/-}{\boldsymbol{c_{jp}/c_{cn}}},\ \overset{+}{\boldsymbol{w_1/w_2}},\ \overset{+/-}{\boldsymbol{\Delta ex}},\ \overset{+/-}{\boldsymbol{X}})} \qquad \textbf{(4-4)}$$

FDIs is the real FDI stock from Japan in China

D denotes the total demand $D_{jp} + D_{cn}$

D_{jp} ,D_{cn} represent the Japanese market demand and the Chinese market demand

c_{jp1},c_{cn} real capital cost in Japan and China

w_{jp},w_{cn} real average wage costs in in Japan and China

Δex represents one period rate of change in the effective exchange rate

X denotes the exports from FDI Japan to China

The sample is from 1984 till 2008. The unit root tests indicate that the exchange rate, the interest rate, the sum of two countries GNP and JP GNP are stationary at level (Table 4-19). FDI stock, FDI inflow, Chinese GNP, Japan’s exports to China, and the wage gap are stationary at first differences.

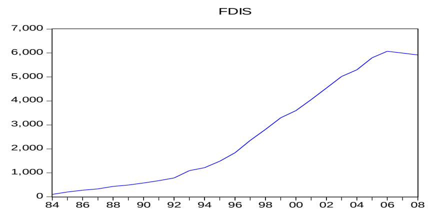


Figure 4-31 The real FDI stock from Japan

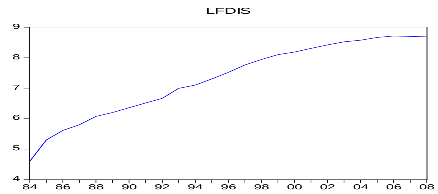


Figure 4-32 The FDI stock from Japan in logarithm

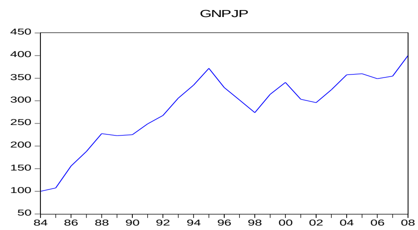


Figure 4-33 The Japan annual GNP

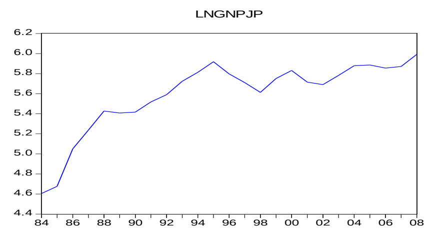


Figure 4-34 The US GNP in logarithm

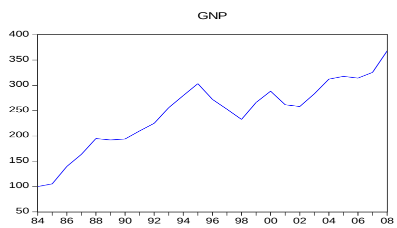


Figure 4-35 The total GNP

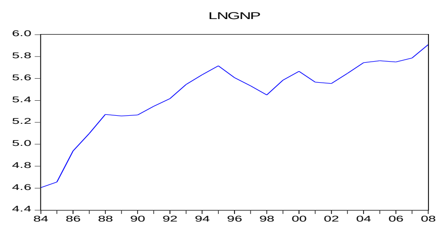


Figure 4-36 The total GNP in logarithm

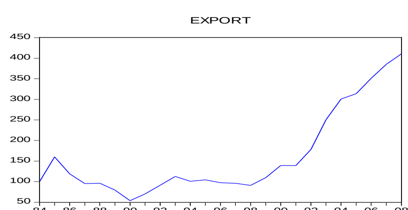


Figure 4-37 The annual Japanese export to China

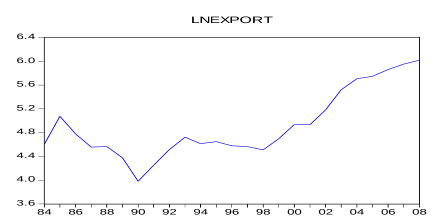
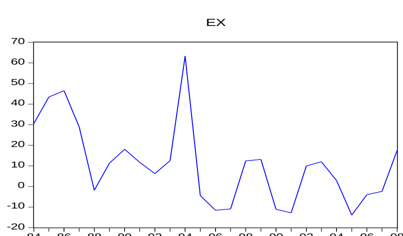


Figure 4-38 The export in logarithm



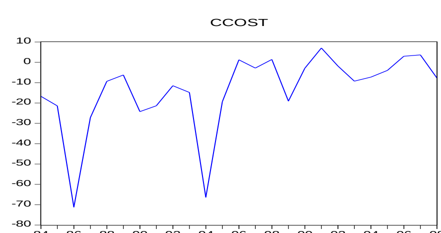


Figure 4-39 The Japan-China exchange rates RMB/ Yen

Figure 4-40 The capital cost gap

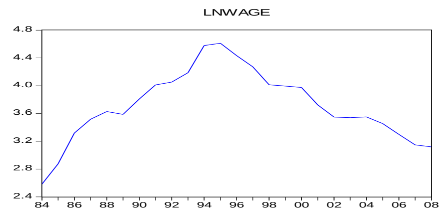


Figure 4-41 The Japan-China wage gap

Figure 4-42 The Japan-China wage gap in logarithm

Table 4-19 unit root estimation on inward FDI from the Japan

Variables	*level*		*First difference*	
(INPT)	ADF	PP	ADF	PP
FDIS	-5.4456***	-5.0691***	-2.5196	-5.2806***
	0.0002	0.0004	0.1246	0.0003
D_{jp}	-3.5609**	-4.7527***		
	0.0149	0.0009		
D_{cn}	1.6344	5.1076	-3.8095***	-1.6291
	0.9992	1.0000	0.0088	0.4523
D	-2.8207*	-3.1259**		
	0.0703	0.0380		
EX	-3.2662**	-3.1338**		
	0.0283	0.0374		
X	1.4797	0.0188	-4.3843***	-4.3843***
	0.9985	0.9515	0.0024	0.0024
w_{us}-w_{cn}	-1.1043	-2.0743	-2.5017	-2.3424
	0.6941	0.2559	0.1280	0.1681
c_{us}-c_{cn}	-3.3318**	-3.2922**		
	0.0246	0.0267		
(INPT+T)	ADF	PP	ADF	PP
FDIS	-2.2715	-2.2359	-7.1083***	-7.1135***
	0.4322	0.4501	0.0000	0.0000
D_{jp}	-4.5097***	-3.3335*		
	0.0082	0.0848		
D_{cn}	-1.0004	8.3869	-4.8438***	-4.5075***
	0.9251	1.0000	0.0047	0.0082
D	-4.1602**	-2.7672		
	0.0171	0.2214		
EX	-4.2937**	-3.7026**		
	0.0129	0.0418		
X	-0.6953	-1.2458	-4.8014***	-5.4095***
	0.9584	0.8770	0.0060	0.0012
w_{us}-w_{cn}	-2.1984	-2.2349	-3.1736	-2.9415
	0.4682	0.4506	0.1141	0.1688
c_{us}-c_{cn}	-4.4389***	-5.6182***		
	0.0091	0.0007		
(None)	ADF	PP	ADF	PP
FDIS	1.2095	3.3736	-2.2218**	-4.0913***
	0.9366	0.9995	0.0283	0.0003
D_{jp}	2.2711	1.9313	-2.7260***	-2.7025***
	0.9924	0.9842	0.0087	0.0092
D_{cn}	1.8654	3.1764	-3.4491***	-1.0887
	0.9819	0.9991	0.0014	0.2418
D	2.6314	-3.4948*		
	0.9967	0.0637		
EX	-2.8971***	-2.7521***		
	0.0057	0.0081		
X	1.3872	1.2928	-4.3793***	-4.3845***
	0.9542	0.9457	0.0001	0.0001
w_{us}-w_{cn}	-0.6961	-0.4240	-2.5958**	-2.4741**
	0.4042	0.5194	0.0119	0.0159
c_{us}-c_{cn}	-2.5795**	-2.4489**		
	0.0123	0.0167		

*** Significant at the 1%, ** significant at 5%, * significant at 10%

4.5.2.2 Short-run and long-run estimation by the ARDL approach

The *F-statistic* results indicate the long-run relationship between the variables for the estimation with total GNP (the first three columns in Appendix Table A4-10). Due to the limitated number of observations, maximum one lag order is superior. The lag order (1,0,0,1,0,1) is selected on the results by AIC and SBC (the first three columns in Appendix Table A4-10).

All three versions of results with one lag estimation with Chinese market effect are supported by AIC and SBC (columns 4-6 in Appendix Table A4-10). The Long - run relationship has been recognized in ARDL-OLS estimation by F-statistics. The SBC selects the form of (1,0,0,0,0,1) (columns 4-6 in Appendix Table A4-11).

For Japanese home market effect, *F*-statistic results of ARDL-OLS estimation indicate the long-run relationship exist between the variables (last three columns Appendix Table A4-10). The lag distribution (1,0,0,1,0,1) is selected by SBC(last three columns Appendix Table A4-11).

Table 4-20 The Results of determinants of FDI in China

	Long run	*Short run*	*Long run*	*Short run*	*Long run*	*Short run*
D	-9.1918*	-0.6654***				
	-1.8687	-5.6306				
D_{jp}					-1.9040**	-0.8168***
					-2.4607	-3.7452
D_{cn}			-2.2085***	-0.8168***		
			-3.0418	-3.7452		
X	4.1701**	0.3019***	0.6248	0.2311**	2.0610***	0.2311**
	2.5907	6.4571	1.5261	2.5844	4.6427	2.5844
EX	0.0553	0.0006	0.0042	0.0016	0.0345*	0.0016
	1.5529	0.5390	0.9346	1.0333	1.8199	1.0333
w_{jp}-w_{cn}	5.2444**	0.3796***	-0.2195	-0.0812	2.5212***	-0.0812
	2.3673	7.2224	-0.9217	-0.8862	3.8932	-0.8862
c_{jp}-c_{cn}	0.1194**	0.0042***	0.0131	0.0017	0.0679***	0.0017
	2.4097	3.2908	1.7444	1.0934	3.4120	1.0934
INPT	20.8674	1.5105***	13.5382***	5.0069***	38.1012	5.0069***
	1.6406	4.0210	4.4259	2.9085	1.7126	2.9085
			0.1732***	0.0641*	0.3498**	0.0641*
			5.4077	2.0170	2.5561	2.0170
ecm(-1)		-0.0724**		-0.3698**		-0.3698**
		-2.5179		-2.7948		-2.7948
R-Squared		0.9322	0.8684		0.8645	
R-Bar-Squared		0.8961	0.7982		0.8052	
S.E. of Regression		0.0460	0.0641		0.0630	
F-stat		34.3786[.000]	14.1350[.000]		20.4109[.000]	
Mean of Dependent Variable		0.1700	0.1700		0.1700	
S.D. of Dependent Variable		0.1426	0.1426		0.1426	
Residual Sum of Squares		0.0317	0.0616		0.0634	
Equation Log-likelihood		45.4898	37.5257		37.1765	
AIC		36.4898	28.5257		29.1765	
SBC		31.1886	23.2245		24.4643	
DW-statistic		2.5226	1.9215		1.4213	

The long-run estimation has four significant coefficients: negative in market size, positive in exports, positive in labour and interest rate gap (Table 4-20). From the magnitude of the coefficients, the most important factor is market size, followed by wage gap and export. The capital cost gap coefficient is much less. Of notice worthy importance is that the market size has a negative effect on FDI stocks in China. The result is from different with its expected effect.

The long-run and short-run effect by the ARDL indicates that the market effect, exports, labour and capital cost have significant coefficients. Different from the US-China country pair estimation, the results for the investment from Japan has a negative coefficient for Chinese GNP and Japanese GNP. The exports from Japan to China exhibit a complementary rather than a substitute relationship. The positive coefficients on wage and capital cost gap indicate the multinational from Japan rely on the low production cost in China.

Fung et al. (2002) discussed the investment survey by Japanese government in 1999 (METI 2001). The research disclosed that more than 49% of Japanese outputs produced in Chinese subsidiaries are sold in local Chinese market, 31% are re-exported back to the Japanese home market, which the rest 20% goes to third countries. Investment from Japan is characterised as export-oriented FDI. The export-oriented FDI need two conditions, the first is accessible production resources to reduce the total production costs, and the second is a geographic location advantage to get the cheap production resources with lower transportation cost.

The results indicate that the coefficients of exports and the wage gap are much larger than the other variables. These two effects are the most important determinant of investment from Japan. Exports have a complementary relationship with FDI stocks. The wage gap indicates that cheaper Chinese wages relative to the home country wage the larger the FDI stocks in China. Lower wage prices reduce the investment cost and raises up the final profit.

Furthermore, both the host market size and home market size have negative effect multinational enterprises to invest in China. The host market effect has a negative coefficient. The results do not exist in pervious empirical research for aggregate

Chinese market, as the expansion of market size raises the profit of multinational firms. However, this hypothesis does not fit re-exported oriented FDI such as the investment from Japan to China

Although expanding the Chinese market size is supposed to increase the market demand of the products (Fung et al. 2002), the production size of Chinese subsidiaries is beyond the market size. In other words, the local production has already met Chinese market demand. The production scale depends more on the global production allocation plan of multinational firms (Pain 1993).

Since the recovery of the Japanese economy when Japan has slowed down the investment in China (Figure 4-33 and 4-34). The aim of this policy is to diversify the investment risk and reduce the economic reliance on China. The investment in China has a negative coefficient with the Chinese economic development and Japanese domestic economy.

Although the coefficient of exchange rate is significant in short-run OLS regression, it is significant at 90% confidence level in long-run ARDL model. The positive coefficient indicates the investment from Japan increase when Chinese RMB depreciation. Chinese currency depreciation reduces the Chinese resources price and reduce the production cost in the balance sheet in Japanese Yen. As most of the Southeast Asian countries and China are de facto pegged to the U.S. dollar. The bilateral exchange rate depends on the Yen and U.S. rate.

Capital cost has a positive effect on the investment from Japan rather than from the USA to China. There are several reasons to do so. United States and Japan firm usually has mature financial market, which could finance the investment in global vision. Liu (2001) argues that the capital cost has more effect on the Chinese investor in joint-venture. The cost capital cost stimulates the Chinese capital to involve the investment project with foreign direct investment.

4.6 Discussion and conclusion

It is widely accepted that a large market and lower labour cost are the main economic factors to attract investment to China. However, there is less empirical evidence to the hypothesis. The purpose of this chapter was to test the determinants of FDI stocks in mainland China with a set of explanatory variables based on the specifications of FDI in previous studies (e.g. Barrel and Pain 1996).

This chapter employs a new methodological framework based on the ARDL approach to explore the effect of the market, trade and product cost effects on FDI stock in China. This approach allows a mix of integration orders of the data series in time series dataset, which suit the data series in China.

To emphasize the geographic effect, the study use three datasets in the research, they are aggregate FDI in China, the US FDI in China FDI and the Japanese FDI in China.

The market size and export effects are not significant in the world-China pair. This is due to the mix of investment motivations which may counterweigh the effects (Table 4-21). The results of US-China are as expected, the growth of Chinese and home market stimulates FDI stock from the U.S. For the Japan-China pair, however, the negative market size effect is different from expectations.

Table 4-21 The comparison of estimation result in long-run

Panel A: Long run effect									
Variable	*World-China*			*US-China*			*Japan- China*		
	GNP	GNPcn	GNPw	GNP	GNPcn	GNPus	GNP	GNPcn	GNPjp
GNP				+	+	+	-	-	-
Export				-		-	+		+
Exchange rate									+
Wage Gap	+		+		+		+		+
Capital cost	+	+	+				+		+
Panel B: Short run effect									
variable	*World-China*			*US-China*			*Japan- China*		
	GNP	GNPcn	GNPw	GNP	GNPcn	GNPus	GNP	GNPcn	GNPjp
GNP				+	+	+	-	-	-
Export				-	-	-	+	+	+
Exchange rate									
Wage Gap	+		+		+		+		+
Capital cost	+		+				+		+

There are three important findings in this study. Firstly, the determinants of inward foreign direct investment in China have different effect across FDI motivations, while the investment motivation is influenced by the geographic location. The investments from the U.S. are more likely to be market oriented; the investment from Japan is re-exported orientated. Due to the limit of geographic distance, the trade cost is relatively higher for US companies; FDI is an alternative low cost channel to explore the Chinese market. The growth of the Chinese market is an important factor to attract the foreign investment to China, in the long-run, the home and host market support the investment. On the other hand, due to the benefit of geographic location, Japanese multinationals benefit from the low labour cost in China to develop re-exports related investment. To reduce its economic reliance on China, serves other investment locations in its close neighbouring countries.

The second finding is related to the market size effect. Firstly, the results proved that market size effect of both home and host market on foreign direct investment in China. Secondly, market size can have a negative effect on foreign direct investment.

With the development of Chinese economy, the target clients in China increased as the number of families, which could afford the products of multinationals, increase quickly (Imamura, 1999). Furthermore, due to the increased gap between rich and poor families in China, the product variety increased. Therefore, the Chinese market is supposed to stimulate investment by foreign multinational firms in China.

However, the influenced market size has restricted by multinational business strategy and government policies. Multinational enterprises globally locate innovation and production to maximize the profit in a firm version (Pains and Barrels 1999). The products have to meet the demand of both home market and host market. Therefore, it is possible to have negative market effect. Furthermore, government policies such as Japanese “one China plus one policy” leads to negative market effect. The policy indicates that the Japanese firms have to make a same amount of investment in the third country while there is an investment in China in case the future development of Chinese economy could increase competitive pressure to Japan. In this case, the increase of Chinese economy might lead more tight economic policy to China. It may diversify the Japanese investment to China. The Japanese investments have to transfer to the third countries, such as India and the Southeast Asian countries.

The third finding is that wage gap effect is restricted by FDI motivation. The large gap wage costs between two countries are supposed to attract the multinationals. The coefficient of wage gap in US-China pair is much less than Japan-China pair. There are several seasons: firstly, the importance of wage cost is different due to the investment type. The investment from Japan are exported orientated, production cost control is important for this type of investment while investment from US are market orientated, which have more focus on market exploration. Secondly, higher transportation cost offsets the wage gaps advantages. Thirdly, FDI accompanied with the technique transfer, which leads to higher skilled labour involvement, such as senior manager, qualified engineer. This raises the labour cost in Chinese subsidies and shuffled the effect of wage gap. However, with low skilled labour involvement investment, for re-exports investment, the skilled labour needs reduced, furthermore, close geographic distance facilities the movement of Japanese high skills labour in China.

The relationship between Export and FDI are determined by FDI type. There is a substitute relationship in US-China country pair. This is due to the geographic distance lead to a higher exporting cost, export has a positive effect, which may due to the geographic advantage, and trade cost is relatively lower. The relationship of FDI and trade are correlated with FDI based on geographic location. The question is discussed in the next chapter.

Chapter 5 The Regional Determinants of FDI in China: A Panel Approach

5.1 Introduction

This chapter explores the determinants of FDI location in China. Different with the studies on the relationship between FDI home and host countries, this study aims to explore the competition between the FDI recipient regions in absorbing investment, which are under the same economy and financial system.

This study developed the research model (equation 4-2) for aggregate FDI in China. More regional factors are incorporated in the model while some national factors are dropped to emphasise the regional competition. One thing of notice is that the advantage of the transportation cost is not sufficient in this study as these provinces are geographically close to each other. The geographic effect not only can be reflected in transportation cost, but also reflected in infrastructure and investment environment, which includes pecuniary externalities, regional agglomeration. This study explores these geographic effects of FDI distribution in China.

The estimation results of previous studies are not consistent due to various model constructions, data selection. Previous literature has suffered from some econometric limitation. There are two econometric research approaches in previous studies: the cross section approach (Gong, 1995; Head and Ries, 1996; Broadman and Sun, 1997; Coughlin and Segev, 2000) and the panel approach (Chen and Fleisher, 1997; Cheng and Kwan, 2000; Wei et al., 2001). The research in cross-sectional approach applies two levels data as the cross-sectional unit: province and city. The administrative unit at the province level is less than 33, the data sample is not sufficient to support cross-section estimation. To avoid this problem, other researches apply the city level data.

The advantage of cities data is that it increases cross-sectional unit. However, inward FDI are not all located in cities. Cities level data cannot cover total FDI in China. Panel approach more effectively deals with the Chinese provinces dataset. Moreover, most previous studies only explore the statistic effect of the factor thorough traditional Fixed Effects and Random Effects approach and assume the variables are exogenous. Yao (2006) applied Arellano-Bond difference GMM approach. However, this approach also suffers from the small data sample.

This study investigates the determinants of FDI in China with a dynamic approach. Both Arellano-Bond difference GMM and Blundell- Bond System GMM approaches are applied to explore the dynamic effect of the variables. System GMM, in particular are more efficient for small data sample.

Another contribution of this study is to investigate the FDI stock in the eastern and western China separately. Previous studies input the eastern regions as a dummy variable in the specification. However, this study explores the factors for subgroup. There are two reasons. Firstly, the eastern regions have more advantages in transportation facilities than the western area. With the restriction on transportation facilities, the effect of the factors is different in these regions. Secondly, the eastern and the western provinces are in different developing stage. The effect of location advantage on the local economy is restricted by local economy level (Dunning 1981). By comparing the effect of the factors, this study investigates the competitions of FDI stock in the eastern and the western areas.

This study contributes to the existing studies in three aspects: Firstly, the study explores the long-run effects of the variables via GMM approach. This approach is efficient to solve auto-correlation problems in dynamic models. Secondly, the study has a large data sample in the econometric analysis during the period of 1995-2006. Thirdly, the study investment the geographic effect with the sub-region estimation on FDI: the eastern coastal area and the western hinterland.

It is very important to explore FDI distribution in China. Firstly, Chinese national and regional government intends to attract FDI with high quality. This study has its reference value to policy maker. Secondly, this study explores the determinants of FDI in the eastern and the western separately. The successful experience in the eastern coast has a demonstration effect on the western regions. Thirdly, the research on FDI competition between recipient regions has reference values to other BRIC regions, and ASEAN countries, in which the economic system of the member states tends to be unified in the integration process.

The structure of the chapter is as follows: the first section after the introduction dis the granger causality test. Section 5.3 discusses the research model and variables. Section 5.4 reports econometric analysis result of nationwide data panel through FE, RE and GMM approaches. Section 5.5 reports the economic analysis result of sub-regional panels. Section 5.5 discusses the estimation research and concluds the findings.

5.2 The causality test

Before the regression, this chapter has to recognize the causality regionship between the FDI in China, trade, Chinese economic development. The granger causality test in chapter 4 explore the relationship at national level. This chapter discusses the interrelationship of these factors at regional level.

Table 5-1 The causality test results of FDI stock in China, Chinese exports, Chinese Economy

	FDIS	***GDPC***	***Trade***
FDIS		74.28*** (0.0000)	0.96 (0.3274)
GDPC	0.44 (0.5096)		5.38** (0.0209)
Trade	0.36 (0.5489)	633.88*** (0.0000)	

Start with the causality test of the overall Chinese data. The results appear that granger causality runs one – way from FDI stock to Chinese economic growth, not the other way round (Table 5-1). Chinese trade to the Chinese economic growth cause the future changes of each other. The Chinese export and FDI stock in Chinese does not cause.

However, the causality test results of sub-region, the eastern area and western hinterland are different with the aggregate value. The granger causality runs from Chinese economic growth to FDI stock in East China and also the other way round (Table 5-2). Furthermore, Chinese trade and Chinese economy development influence each other. The causality test runs one-way from FDI to the international trade in the east area, not the other way round. This indicates that the FDI stock in the east China is driven by both the trade and economy size in the area. The east China economy is also driven by FDI stock and international trade.

Table 5-2 The causality test results of FDI stock in China, Chinese exports, Chinese Economy in east area

	FDIS	*GDPC*	*Trade*
FDIS		140.66*** (0.0000)	1.58 (0.2113)
GDPC	11.63*** (0.0009)		7.25*** (0.0081)
Trade	6.56*** (0.0117)	494.50*** (0.0000)	

Table 5-3 The causality test results of FDI stock in China, Chinese exports, Chinese Economy in west area

	FDIS	*GDPC*	*Trade*
FDIS		0.81 (0.3680)	0.06 (0.8008)
GDPC	17.20*** (0.0000)		0.90 (0.3446)
Trade	13.68*** (0.0003)	408.50*** (0.0000)	

The causality test for the west area finds three one-way relationships. The results indicate the FDI stock in the west area is driven by local economy and international trade volume. The local economy is only driven by the international trade, but not FDIs stock in the area. The international trade is not influence by the other two factors.

Although the causality test could not proved that the international and economy drive the future changes of FDIs in China with overall province data. However, the sub-regions test finds these two factors will influence the FDI in east and west area of China. Therefore, FDI stocks in China, trade, Chinese economic growth are supposed to influence the future changes of the other two variables in these regions. This chapter will have a further discussion the determents of FDI in China, which includes the Chinese market effect and international trade as the explanatory variables.

5.3 The model and variables

This section discusses the estimated model and the expected effect of variables. Section 5.3.1 discusses the specification. Section 5.3.2 explains the specification and variables in detail. Section 5.3.3 discusses the data series selection.

5.3.1 Specification contruction

This research model in this study is based on the specification model in Chapter 4 with the adjustment of the regional characteristics. There are several issues to be concerned:

- The exchange rate. Renminbi (RMB) or Yuan is the only currency circulated in mainland China[33]. The exchange rate is regional-invariant.

- The interest rate. The Chinese financial system is highly integrated (Porter and Xu 2000). The monetary and fiscal policies are authorized to three main institutions: the People’s Bank of China (Central Bank), Ministry of Foreign Trade and Economic Co-operation and Ministry of Finance of the People's Republic of China. The interest rate or capital costs decisions are integrated in China. It does not fit dataset.

[33] Hong Kong, Macao, and Taiwan are not included in the dataset as the FDI recipient region. In this case, the currency in these areas would not influence the regional FDI distribution in mainland China.

- The labour cost gap, capital cost gap and the liquidity of production factor variables. The classic comparative advantage theory H-O model assumes that the cross border factor markets are imperfect. However, cross region production factors in China have more liquidity than cross-border movement. Capital freely flows between provinces. Cross-region labour is supposed to have more liquidity than cross-border labour. However, cross-sectional labour is less liquid than capital flows, due to the family effect and education effect. Therefore, labour is included in the model while the capital cost does not.

- The single market. Previous researches apply GDP as the proxy to measure the regional market size. However, China is an integrated market. Multinational enterprises serve the clients in the entire Chinese market. The data series GDP loses its explanatory power as a proxy for market size, because the customers can easily access the neighbouring regions (Mariotti and Piscitello, 1995). In this study, regional productivity variables, such as GDP or GNP, do not suitably serve as a proxy for market power.

However, GDP growth is a proxy for economic potential (Barrel and Pain 1998, Agarwal 1990, Mainardi 1992). From this point of view, the economic development are supposed to attract multinational firms.

5.3.2 The specification and the variables

The main determinants of foreign direct investment discussed in previous research for inward FDI distribution include local market demand, local market growth, openness, labour cost, skill labour rate, education level, technique level, local infrastructure, coastal area effect and political influence (Chapter 3). According to the Chinese regional characteristics (section 6.3.1), the specification applied in this study is as below:

$$FDI = f(\mathrm{EP}, \mathrm{openness}, \mathrm{wage}, \mathrm{Tech}, \mathrm{infrastructure}) \quad \textbf{(5-1)}$$

EP	indicates the economic potential
Tech	indicates the technology level
Openness	is the openness of local economy
Infrastructure	represent the tranpotation facility

Openness

Openness of economies usually refers to the economic connection with other economies. The regions with more foreign business connection are expected to be more attractive to multinational firm. There are two main important reasons: Firstly, openness enables the business partners to learn the background, culture, regulations. Secondly, it facilitates the business information flow (Wei 2001). This results in more business or investment opportunity in the future.

The Chinese market opening process took several stages from Southeast coastal to western hinterland (Chapter 2). The five SEZs, earliest open markets, locate in Guangdong and Fujian. Following the SEZs, 14 coastal cities (OCC) and Hainan province open to the foreign investors. They have rich experience in cooperation with multinationals. Foreign investments located in the hinterland areas after 1992. Therefore, coastal areas have long history in the foreign cooperation in business. However, the openness is not measured by the time of development in the empirical, but by the trade volume in terms of GDP for the regional openness involved in the international economy.

Openness is a proxy for trade (Wei 2001, Zhang and Zhu, 2000). The empirical results related openness factor demonstrated a positive influence of international trade on the regional inward FDI.

Economic potential

Economics potential is supposed to stimulate FDI inflows. It is a particularly important factor for market seeking FDI, which bring future business opportunities and market exploration. The proxies in previous studies are economic profitability rates (Wang & Swain 1995), GDP level, or the growth rate of GDP (Goldberg 1972, Wei et al 2001).

The results of previous studies indicate that the higher level of economic growth intends to stimulate the inflow in China.

Labour cost

Lower labour costs are recognized as an attractive factor for foreign investment (Huber and Pain 2002; Barrell and Pain 1997, Wheeler and Mody 1992). The studies on FDI in China tells that low labour cost is an important factor for FDI to explore international differences in factor prices which was applied as an explanatory variable in almost all the research papers we mentioned in this section. Particularly, the inward FDI in China clustered in the labour intensive manufacturing industry. MNEs, by employing cheap labours, could reduce the production cost. The empirical study in Chapter 5 found the large wage gap stimulated inward FDI stock in China, the wage gap difference cross province in China is supposed to stimulate FDI stock in local area.

Labour cost is measured by wage in previous studies on FDI special distribution (Coughlin & Segev, 2000; Cheng and Kwan, 2000; Fung et al., 2000; Wei et al., 2001). It has a negative effect in FDI attraction. However, such a measure is not without problems. For example, multinational firms in China tend to pay a wage premium to their worker to avoid the outflow of the human capital (Branstetter and Feenstra, 1999). Therefore, wages can have a positive effect on FDI inflow into China (Zhao and Zhu, 2000). Furthermore, wage can reflect the labour quality (Swedenborg, 1979; Dunning, 1980; and Veugeler, 1991). The positive effect indicates that the cluster of higher skill labours which foreign investors seek may influence the location decision.

Although relatively cheaper labour is an important factor in the location decision, human capital quality is expected to support the development of the FDI in China. However, the empirical results of the wage and FDI stock are relatively ambiguous. The labour quality is often measured by illiteracy rate (Broadman and Song 1996, Coughlin and Segev 2000), university student rate to population (Liu 2009; Fung et al 2000), senior, junior and primary school student education population (Cheng and

Kwan 2000). Except the paper by Cheng and Kwan, all the other empirical work concluded that a higher education rate attracts more inward FDI.

Technology

Technological gap is an important factor identified in previous studies that influence the location decision of multinational firms. Firm specific asset is transferred to the host country along with the production process (OIL theories). However, the transfers of these technologies need local technological support. In particular, some technologies could not fit directly the Chinese market, which requires the local technology team to make new innovation in technology. A large amount of multinational firms establishes new research centers for Chinese client characteristics and environment. Therefore, the local research capability is expected to attract FDI.

R&D manpower in China is not equally distributed. It clusters in Beijing, Shanghai, Guangzhou these business and financial cities. The skilled labour supports the multinational firms with high technology requirement.

The proxy index used in the studies includes R&D manpower (Wei et al 2001, Sun et al 2002). R&D expenditures and number of patents, high level of scientific research are often used as the technique level of the local economy. R&D expenditures and number of patents, high level of scientific research are often used as the technique level of the local economy.

The papers examining the technique level of China are limited. Wei et al (2001) and Sun et al (2002) applied RSET (number of research scientists, engineers and technicians to regional employment or to regional population) as the proxy. Wei et al (2001) found a positive relationship between RSET and inward FDI. However, Song et al (2002) reported a negative effect of RSET in sample period 1987-1991, an insignificant result during period 1992-1998.

Infrastructure

Infrastructure covers many aspects of the economy, including transportation, communication, environmental protection, education, medical & recreational (Liu 2009). Regional infrastructure is supposed to be positively related to inward FDI in China. This is due to a good environmental support for FDI direct.

The previous literature proxies infrastructure by highway length, railway mileage, river, paved road per square kilometre and air staff for transportation situation. The GDP per square kilometre is a proxy for the quality of infrastructure (Chen and Fleisher 1996, Sun et al. 2002; Cheng and Kwan 2000, Wei et al. 2001, Coughlin and Segev 2000).

This study focuses on the transportation infrastructure. There are three variables used to represent the facilities: river density (river length kilometre/province area kilometres), road density (road length kilometre/province area kilometres) and railway density (railways length kilometre/province area kilometres).

This study used the transportation density rather than the length of transportation resource. This is because the area difference between provinces is large. Density value has better reflect the infrastructure situation.

Through the past 20 years, the Chinese government has taken steps to improve the investment environment for the foreign investors. It is expected to have a positive effect on foreign direct investment distribution.

Therefore, the research model of the foreign investment equation is as follows:

$$\begin{aligned} FDI_{it} &= \alpha + FDI_{i,t-1} + \beta_1 wage_{i,t-1} + \beta_2 growth_{i,t-1} + \beta_3 Tech_{i,t-1} + \beta_4 trade_{i,t-1} \\ &+ \beta_5 Rail_{it} + \beta_6 River_{i,t} + \beta_7 Road_{i,t} + \varepsilon_{it} \end{aligned} \qquad \textbf{(5-2)}$$

where variables Y and X have both i and t subscription for i =1, 2, …, N sections and t = 1,2,…,T time periods. All the endogenous independent variables have one time lag because the investment decision is based on the former economy observation by multinationals. The variable endogeneity recognition is discussed in section 5.4.2.

5.3.3 Data series

The panel dataset of this study covers 28 provinces in the mainland of China. To get more reliable econometric results, the data series from Tibet and Qinghai provinces are excluded, since the investments in these two provinces are relatively less and unstable. The province data is superior to city level data because it ensures the results reflect the real influence of these explanatory variables on the FDI location decision and avoid sample selection bias. The data are from *Chinese Statistics Yearbook* by Chinese Statistics Bureau and Chinese foreign investment report (2002-2007) by Ministry of Foreign Trade and Economic Co-operation. All of the monetary data in this study are converted to 1994 constant value using the relevant deflator[34]. Since GDP, domestic investment, and wage is denominated in RMB (Chinese currency), FDI and trade volume exhibits in US dollars, all the variables of the US dollar was converted into RMB by the annual average RMB/dollar exchange rate. In this case, all data used in the analysis are in the unit of the Chinese Yuan.

An econometric problem of regional dataset is that the difference in the regional units may lead to estimation bias. For example, the land area of Xingjiang province is 1,600,000 km^2, which is 200 times more than the area of Shanghai (5,800 km^2). In this regression, the variables are in the form of relative value, such as the density of the railway (rail mileage km per km^2) rather than the real railways length was used as the proxy index for the infrastructure. For the same reason, the independent variable was constructed as accumulated FDI relative to the local GDP in logrithem. Technique level is measured by local high technology transaction price in terms of local GDP in logarithm. Openness is measured by trade in terms of local GDP in logarithm.

FDI is measured by regional annual FDI stock relative to regional GDP. Wage is the real average wage level. It is measured by nominal regional average wage adjusted by deflator. Growth is the growth rate of real GDP in logarithm. The data is from the National Statistics Bureau. Here GDP growth rate is superior to GDP value, because our dependent variable is measured by the relative FDI in terms of GDP. It does not fit

[34] In the chapter, regional CPI was used as the deflator for wage, trade and GDP.

the real GDP series. GDP growth rate measure the development trend of the regional economy.

Trade is foreign exports to China in logarithm relative to regional GDP, which is used to value the openness of local economy.

Rail is the railway length in the region in terms of regional land area. *River is* the railway length in the region in terms of regional land area. *Road is* the railway length in the region in terms of regional land area. These are the transportation infrastructure variables.

Tech is local technique level, which is measured by the transaction value in the local high technology market in term to regional GDP in logarithm. It has not been applied in the relative research for the Chinese market. This study chooses the transaction value because it could reflect the quality and quantity of local technological level.

5.4 Econometric Results

This section involves four subsections. Section 5.4.1 tests the multicollinearity of the data series. Section 5.4.2 recognizes endogenous variables for the dynamic estimation. Section 5.4.3 reports the results for dynamic estimation.

5.4.1 Multicollinearity

In the correlationship matrix table, some of the variables have a higher correction between each other, such as FDI stock with trade, FDI stock with foreign presence (Table 5-4).

Therefore, a variance inflation factor (VIF) test is therefore applied to detect the possible existence of multicollinearity. The result of the VIF test indicates there is no great multicollinearity in the dataset (Table 5-5).

Table 5-4 The correlation matrix of the variables

	FDI	*Growth*	*Trade*	*Wage*	*Tech*	*Rail*	*River*	*Road*
FDI	1.0000							
Growth	-0.0326	1.0000						
Trade	0.6967	-0.0184	1.0000					
Wage	0.1743	0.0926	0.6476	1.0000				
Tech	0.5233	-0.0364	0.5504	0.3837	1.0000			
Rail	0.3544	0.0492	0.4770	0.3701	0.3713	1.0000		
River	0.4634	0.0132	0.5222	0.3539	0.3732	0.3185	1.0000	
Road	0.4555	0.0446	0.6598	0.6700	0.3956	0.5567	0.5032	1.0000

Table 5-5 The VIF estimation result for variables

variables	*VIF*	*1/VIF*
l. trade	4.64	0.215713
L.road	3.95	0.253034
L.FDI	3.44	0.290928
L.wage	2.29	0.436019
L.rail	1.67	0.600124
L.river	1.60	0.623170
L.tech	1.51	0.661727
L.growth	1.03	0.970378
Mean VIF	2.63	

5.4.2 Endogeneity test

In the dynamic estimation, there is an auto-correlation problem. Due to this limitation, the traditional model does not fit the dataset. GMM approach is necessary to reduce this problem.

Table 5-6 The results of System Exogeneity Tests

Variables	*Exogeneity test*	*P value*
Growth	2.756*	0.0969
Trade	6.085**	0.0136
Wage	4.687**	0.0304
Tech	3.980**	0.0461
Rail	0.261	0.6093
River	1.452	0.2282
Road	0.748	0.3871

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level.

The first step of GMM approach is to identify the endogenous variable and exogenous variables. A system exogeneity tests (command: *xtivreg2*, software: *STATA*) are performed to measure whether the endogenous variable test could be converted into exogenous variables. The result of *chi* – statistics indicates that growth, foreign presence are significant at 90% confidence level. Openness, wage, and technology are significant at 95% confidence level. The null hypothesis is rejected. These variables should be treated as endogenous variables (Table 5-6). However, the results of chi – statistics for the infrastructure variables: rail, river, road are not significant, which cannot reject the null hypotheses, therefore, which could be converted as the exogenous variables. Therefore, wage, GDP growth, foreign presence technological level and openness as the potential endogenous variable and leave infrastructure as the exogenous variables.

5.4.3 GMM estimation and explanation

As the results of one-step and two-step GMM are similar in coefficient and significant level, this section reports the results of one-step GMM test (Table 5-7). Although two-step GMM is more efficient (Arellano and Bond 1991), one-step GMM fit this study for the small sample size.

The results in first two columns of each table are from Blundell- Bond system GMM approach with and without constant variables (command: *xtabond2*, sofrware: *STATA*). The last column reported the results from Arellano and Bond difference GMM with robust, which automatically exclude the constant variables. All the results are reported with robust in case of the existence of heteroskedaticity in the estimation data series which was from the result in previous likelihood test (Table 5-4).

The diagnostic tests support the results. The results of first-order and second-order serial correlation test indicate that the error term does not exhibit serial correlation in the second order. The Hensen test does not reject the hypothesis for the estimation with robust. The results of the *F*-statistics and the *Wald* test indicate that overall variables are significant. Furthermore, Difference-Hansen statistics that specifically tests the additional moment conditions used in the level equations accepts validity at 90% level and exogeneity validity. The difference-Hansen test is insignificant for *iv* variables, which could not reject the null hypothesis for validity of exogenous variables.

The results of the system GMM approach are superior to the results by difference GMM. There are two main reasons. Firstly, system GMM (hereafter, GMM-sys) is more suitable for small sample in this study. It not only includes the difference endogenous variables but also the level data in the estimation. For small sample estimation, GMM-sys includes more observations than the difference instruments. Therefore it is more superior to the difference approach.

Secondly, GMM-sys has a less estimation bias in this study. The coefficient for lagged FDI stock is expected to be near 100%, around 90% for GMM-sys, 50-60% for GMM-diff (Difference GMM). Compared with the coefficient in OLS, FE and RE estimation, the coefficient is 91.3% and 91.5% in OLS and RE GLS respectively (Appendix Table A5-1, A5-2), which appears to give an upwards-biased estimate of the coefficient. This may be due to the regional specific effect. The coefficient of lagged independent variables is 61.9% in FE, which appears to give a downwards-biased estimate of this coefficient.

The estimated coefficient of the lagged FDI stock is barely higher than FE within groups estimate (Table 5-7). In this case, the instrument variables are likely to be weak as the coefficients are biased downwards (Blundell and Bond 1998).

The GMM-sys parameter estimation appears to be reasonable. The estimated coefficient on the lagged FDI stock is higher than the coefficient in FE estimation. One-step and two-step GMM-sys with constant variables are slightly smaller than the OLS level estimate. Estimation with no constant variables is slightly higher than OLS.

The GMM-system estimation recognized positive growth rate, lower wage level, the presence of foreign investment stimulates the investment in China. Furthermore, the environment infrastructure of river densities stimulates the investment.

A 1% increase in GDP growth rate would increase inward FDI stock in terms of local GDP by 0.002% in the next time period (First column, Table 5-7). The GDP growth variable is expected to capture the development of region an economy. The results support the impact of Chinese economy potential on foreign direct investment, which is consistent with Wei et al (2001). The labour cost is significantly negative in the regressions as 1% decrease in wage increases FDI stock by 0.017% (First column, Table 5-7). The results also show that the FDI in China is influenced by cheap labour.

The river densities have a positive effect on the FDI investment. However, effects of road and railway are insignificant.

Table 5-7 The result of one-step GMM estimation for FDI stock in overall China

	system		***system***		***difference***	
	Coefficient	*(t-stat)*	*Coefficient*	*(t-stat)*	*Coefficient*	*(t-stat)*
FDIs (-1)	.9484351***	(51.88)	.9848361***	(59.23)	.9848361***	(59.23)
Growth(-1)	.0021507*	(2.02)	.0021072*	(1.71)	.0021072*	(1.71)
Trade(-1)	.0242623	(0.75)	.0429218	(1.60)	.0429218	(1.60)
Wage (-1)	-.0178958***	(-5.19)	-.006108*	(-1.86)	-.006108*	(-1.86)
Tech(-1)	.0111755	(1.29)	.0176549*	(1.96)	.0176549*	(1.96)
Rail	.058221	(0.62)	.0368952	(0.72)	.0368952	(0.72)
River	.0276527**	(2.76)	.0104991	(1.55)	.0104991	(1.55)
Road	.0054725	(1.40)	-.0153631***	(-3.78)	-.0153631***	(-3.78)
C	.0911337***	(4.61)				
No of observation	284		284		257	
F-statistics	1713.89		251237.95		34.51	
Prob > F	0.000		0.000		0.000	
AR(1)	-1.15		-1.14		-1.31	
Pr > z	0.250		0.254		0.189	
for AR(2)	-0.19		-0.14		-0.22	
Pr > z	0.846		0.890		0.828	
Hansen test of overid	21.27		23.76		24.85	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	20.49		23.50			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	0.78		0.26			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	18.10		23.08		24.85	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	3.17		0.68		0.000	
Prob > χ^2	0.367		0.878		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

5.5 Econometric Results of the subgroups

Previous studies have used the coastal area location or SEZ as the dummy variable to estimate spatial FDI determinants. The background section noticed that the investment in China is highly clustered in the eastern coast. Furthermore, special economic zones and open coast cities are all along the eastern area. Therefore, section 5.5 divides the sample into two subgroups, which is coastal regions and hinterland area. The coastal group contains the 11 provinces of Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan. The remaining 17 groups were bulked into the hinterland group.

This section consists of two sub-regional regressions separately, Section 5.5.1 focuses on the eastern coastal region, while section 5.5.2 analysis the determinants of FDI in the western hinterland.

5.5.1 The eastern Coast Area

This section has three parts of econometric work. Section 5.5.1.1 tests the multicollinearity of the data series. Section 5.5.1.2 recognizes endogenous variables for the dynamic estimation. Section 5.5.1.3 reports the results.

5.5.1.1 Multicollinearity

Same as correlation test for the whole group. FDI stock data series has a high correlation with trade, foreign presence (Table 5-8). However, the result of the VIF test indicates there is no serious multicollinearity in the data set (Table 5-9).

Table 5-8 The correlationship of the variables

	FDI	*Growth*	*Trade*	*Wage*	*Tech*	*Rail*	*River*	*Road*
FDI	1.0000							
Growth	0.0131	1.0000						
Trade	0.6398	0.2616	1.0000					
Wage	0.3077	0.5221	0.6550	1.0000				
Tech	0.0930	0.0494	0.5973	0.3872	1.0000			
Rail	-0.0136	0.1641	0.3755	0.3043	0.6162	1.0000		
River	0.1746	0.0099	0.5010	0.4171	0.4627	0.3369	1.0000	
Road	0.3643	0.3631	0.6566	0.7296	0.4316	0.4623	0.5465	1.0000

Table 5-9 The VIF estimation result for variables

Variable	VIF	1/VIF
L.Trade	8.66	0.115439
L.Road	4.64	0.215603
L.FDI	3.28	0.305115
L.Tech	2.84	0.352393
L.Wage	2.82	0.355024
L.River	2.22	0.451049
L.Rail	2.01	0.497446
L.Growth	1.83	0.547884
Mean VIF	3.56	

5.5.1.2 Endogeneity test

A system exogeneity tests are applied to recognize whether the endogeneity test could be converted into exogenous variables. The results of the *chi* – statistics of growth, trade, wage foreign presence and technology are significant at 95% confidence level. The null hypothesis of exogenous variables is rejected. While, the result of the *chi* – statistics the infrastructure variables: rail, river, road are significant. The null hypotheses cannot be rejected, therefore, which indicates that these variables can be converted as the exogenous variables. Therefore, wage, GDP growth, foreign presence technological level and openness as the potential endogenous variable and leave infrastructure variables as the exogenous variables.

Table 5-10 The result of System Exogeneity Tests

	test	*P value*
Growth	4.644	0.0312
Trade	4.480	0.0343
Wage	4.761	0.0291
Tech	6.450	0.0111
Rail	0.421	0.5166
River	1.065	0.3020
Road	0.024	0.8757

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

5.5.1.3 GMM estimation and explanation

The estimation results for FDI stock in the eastern area of China are reported in Table 5-11.All the results are reported with robust standard error to deal with possible heteroskedaticity in the data series. The diagnostic tests support both the results validity by one-step and two-step GMM. Due to the small sample size as previous whole group estimation, the results by GMM-sys approach are superior to the results by GMM-diff (Table 5-11).

Table 5-11 The result of one-step GMM estimation for FDI stock in eastern coastal China

	system		***system***		***difference***	
	Coefficient	*(t-stat)*	*Coefficient*	*(t-stat)*	*Coefficient*	*(t-stat)*
FDIs (-1)	.9315282***	(56.23)	.9771266***	(57.89)	.782426***	(15.86)
Growth(-1)	-.0006568	(-0.41)	.0001165	(0.05)	-.0026831	(-1.56)
Trade(-1)	.0776169**	(3.07)	.0747433**	(2.67)	.0594694	(1.72)
Wage (-1)	-.0148417***	(-5.01)	-.0100365***	(-4.74)	-.0071468*	(-1.95)
Tech(-1)	-.0068137	(-0.52)	.0113944	(0.78)	.0181979**	(2.35)
Rail	.0222333	(0.32)	.0317237	(0.56)	-.4605987*	(-2.25)
River	.0111341**	(2.83)	.006079	(0.97)	-.0418815	(-0.49)
Road	-.0033196	(-0.67)	-.0136573*	(-2.11)	-.0036666	(-0.71)
C	.067247***	(8.12)				
No of observation	97		97		87	
F-statistics	171946.63		76547.08		5681.98	
Prob > F	0.000		0.000		0.000	
AR(1)	-0.72		-0.63		-1.68	
Pr > z	0.470		0.528		0.092	
for AR(2)	-1.84		-1.85		-1.25	
Pr > z	0.065		0.064		0.210	
Hansen test of overid	0.00		0.00		0.00	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	0.00		0.00			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	-0.00		-0.00			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	0.00		0.00		0.00	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.00		-0.00		-0.00	
Prob > χ^2	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

The results indicate export, wage level, river densities stimulate the foreign investment in the regions. Lower wage level triggers the foreign investment. A 1% decrease in wage cost stimulates FDI by 0.015% (First column, table 5-11).

Chen and Fleisher (1996) found that the coefficient of wage in the Chinese coastal area is insignificant. However, one-step GMM estimation in this study found the significantly negative effect on wage level in the coastal area. There are two reasons for the different estimation results: Firstly, this study applied GMM dynamic estimation, which has different effects from results conducted with cross-section and panel OLS pool approach by Chen and Fleisher (1996). Secondly, this study applies different time periods of 1994-2007. Foreign direct investment is more matured in China in this period compared the research time period of 1987-1991 used by Chen and Fleisher (1996). The importance of skill labour reduces with the openness process in the coastal area. Due to the technological development in China and rich experience with foreign cooperation, Chinese labours and local management teams have a better understanding of the new technology and management background in multinational firms. Therefore, the skills labours in multinational relative to unskilled labours reduced. The labour cost competitive capability has more impact to attract foreign direct investment than labour quality in recent years.

Different with the results in the previous estimation for whole group dataset, there is a significant positive coefficient of international trade with FDI stock in coastal area while foreign capital rates are insignificant. The coefficient is 0.078 (First column, Table 5-11). implying that, a 1% increase in foreign export to the region would increase FDI stock in the region by 0.078% in the next time period, the coefficient is largest among the independent variables except the lagged FDI stock. An increase in trade attracts the inward FDI. In the early 1980s, the multinationals in China tend to develop the assembling and processing business for exporting. The trade might cause a positive impact on the FDI.

Variables for trade in this study proxy for openness. The openness of regional economy stimulates multinational firms for three anticipate as it develops the business understanding between multinational enterprises and local government and local labours. This further, supports the labour cost effect. Furthermore, open economy raises the business cooperative opportunities between multinational firm and local Chinese firm.

River density is the only infrastructure resource which stimulates the investment into the region. A 1% increase in river infrastructure increases FDI stock by 0.011%. Furthermore, the coefficient for technological is not statistically significant, which indicates the local technological level does not attract the foreign investment. Road and railway do not have insignificant effects as well.

One thing to notice is that the local economic development does not have a significant effect on FDI. This is different from the whole group estimation results. However, it did not exhibit the system measure. Chen and Fleisher (1996) report a positive effect of the market potential on the investment, which is different from this study's result.

5.5.2 Hinterlands

There are three stages of the econometric process in this estimation. Section 5.5.2.1 tests the multicollinearity of the data series. Section 5.5.2.2 identifies endogenous variables for the dynamic estimation. Section 5.5.2.3 reports the results for dynamic estimation

5.5.2.1 Multicollinearity

FDI stock with trade, FDI stock and foreign presence have high correlation in this subgroup dataset (Table 5-12). However, the result of the VIF test indicates there is no great multicollinearity concern about the data set (Table 5-13).

Table 5-12 The correlation of the variables

	FDI	*Growth*	*Trade*	*Wage*	*Tech*	*Rail*	*River*	*Road*
FDI	1.0000							
Growth	-0.0536	1.0000						
Trade	0.5017	-0.0811	1.0000					
Wage	0.2239	0.0881	0.5635	1.0000				
Tech	0.4139	-0.0549	0.4775	0.2862	1.0000			
Rail	0.3271	0.0811	0.0857	0.2411	-0.0201	1.0000		
River	0.5389	0.0125	0.5819	0.1890	0.2749	0.0033	1.0000	
Road	0.4001	0.0286	0.4025	0.5212	0.2479	0.4940	0.3798	1.0000

Table 5-13 The VIF estimation result for variables

Variable	*VIF*	*1/VIF*
L.trade	2.63	0.380423
L.road	2.50	0.400063
L.river	2.38	0.420015
L.fdis	2.13	0.469622
L.wage	1.90	0.526750
L.rail	1.80	0.554975
L.tech	1.56	0.640327
L.growth	1.06	0.940322
Mean VIF	2.04	

5.5.2.2 Endogeneity test

The result of *chi* – statistics of growth, trade, wage are significant at 90% confidence level. Foreign presence and technology are significant at 99% and 95% confidence level. This rejects the null hypothesis. These variables should be treated as endogenous variables (Table 5-14). The results of *chi* – statistics of the infrastructure variables: rail, river, road could not reject the null hypotheses. These variables could be converted as the exogenous variables. Therefore, wage, GDP growth, technological level and openness as the potential endogenous variable and leave infrastructure as the exogenous variables.

Table 5-14 The result of system Exogeneity Tests

	test	*P value*
Growth	3.041	0.0812
Trade	2.918	0.0876
Wage	3.638	0.0565
Tech	5.479	0.0192
Rail	0.863	0.3529
River	2.407	0.1208
Road	0.187	0.6657

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level.

5.5.2.3 GMM estimation and explanation

The results of the one-step GMM approach are reported in Table 5-15. The diagnostic tests prove the validity of the results.

Table 5-15 one-step GMM for FDI stock in hinterland

	system		system		difference	
	Coefficient	(t-stat)	Coefficient	(t-stat)	Coefficient	(t-stat)
FDIs (-1)	.8927954***	(31.55)	.5439073***	(3.94)	.9759424***	(46.83)
Growth(-1)	.0016759*	(1.81)	.0008388	(1.61)	.0019026	(1.57)
Trade(-1)	-.0884229	(-1.12)	-.1769804	(-1.58)	.0313026	(0.60)
Wage (-1)	-.0141957**	(-2.41)	.0086238	(0.79)	-.0054281	(-0.77)
Tech(-1)	.048203**	(2.81)	.0406759	(0.93)	.0370113	(1.57)
Rail	.4120705	(1.19)	-.4223045	(-0.61)	.2629971	(0.89)
River	.1305418***	(3.53)	.1666472	(0.27)	.0188897	(0.92)
Road	.0012086	(0.25)	.0080925	(1.06)	-.0149076**	(-2.07)
C	.1805649***	(4.35)				
No of observation	187		187		170	
F-statistics	1535.43		951079.48		31.15	
Prob > F	0.000		0.000		0.000	
AR(1)	1.18		-1.15		-1.35	
Pr > z	0.236		0.249		0.176	
for AR(2)	0.05		0.10		-0.26	
Pr > z	0.958		0.918		0.799	
Hansen test of overid	8.48		11.72		7.05	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	6.96		11.88			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	1.51		-0.16			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	8.48		9.44		7.05	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.00		2.28		-0.00	
Prob > χ^2	1.000		0.517		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

One-step system GMM with robust test found that regional growth and river have significant coefficients. The estimation results for hinterland are different with the coastal area.

Local economic growth in the hinterland plays an important role in FDI attracting. A 1% increase in regional GDP growth rate stimulates the investment by 0.0016% in the next time period.

Wage effect has a negative effect the GMM estimation. The result is consistent with research by Chen and Fleisher (1996). The wage is relatively lower in the hinterland. This is partly due to the human capital is not rich to support the development of multinational firms in the area.

Trade has an insignificant negative effect. Due to the geographic limitation, multinationals in the hinterland do not have advantage to develop the assembling and processing business for exporting. Therefore, the impact of trade on the FDI is not significant.

In the literatures, international trade can be used as the proxies for openness. The openness of regional economy does not stimulate multinational firm's investment. This is due to two reasons. Firstly, for local enterprises in the lower industrialization process, the competitive capability of local firms is low. Therefore, the openness of the economy is relatively lower to support Chinese domestic firms. Secondly, transportation impede the foreign capital access to hinterland areas.

Same as the eastern coastal area, river density is the only infrastructure variable which has a positive coefficient on FDI stock in the regions. A 1% increase in river density increases FDI by 0.13%, which is the most important factor in the hinterland subgroup estimation.

5.6 Discussion and conclusion

Summarising the location advantages of two subgroups, the eastern coastal provinces contain the advantages in trade, technology, foreign presence, and local economic growth and transportation facilities. While the hinterland has cheap labour cost (Table 5-16, 5-17).

Table 5-16 statistics of variables

Variables	*Panel A: Coastal area*			*Panel B: hinterland*		
	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
FDI	130	0.9218	0.0591	234	0.7862	0.0769
Growth	120	0.8749	0.4234	217	0.6678	3.3170
Trade	130	0.9187	0.0722	234	0.7864	0.0605
Wage	130	4.5099	0.4805	234	4.1653	0.4036
Tech	127	0.6324	0.0986	233	0.5520	0.1007
Rail	121	0.0263	0.0197	216	0.0108	0.0052
River	108	0.0640	0.1018	204	0.0293	0.0537
Road	120	0.5670	0.2542	216	0.2746	0.1995

Table 5-17 Advantage resource comparison

Coastal area	*Hinterland*
Growth , trade, tech, Rail, River, Road	wage (lower wage)

Table 5-18 summery of One-step GMM estimation results for three groups

Variables	*Overall group*		*Coastal subgroup*		*Hinterland subgroup*	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
FDI (-1)	0.9158***	44.69	0.9324***	50.07	0.8827***	26.18
Growth(-1)	0.0023**	2.20	0.0013	0.93	0.0021**	2.21
Trade(-1)	-0.0067	-0.18	0.0664*	2.29	-0.0995	-1.27
Wage (-1)	-0.0142***	-3.97	-0.0140***	-4.98	-0.0102	-1.38
Tech(-1)	0.0085	1.10	-0.0065	-0.43	0.0281**	2.19
Rail(-1)	0.0460	0.44	0.0519	0.59	0.2273	0.66
River(-1)	0.0200**	2.70	0.0150**	2.47	0.1079***	3.18
Road(-1)	0.0036	0.52	-0.0081	-0.86	-0.0102	-0.71
C	0.0693***	4.55	0.0579***	5.50	0.1427***	4.51

Table 5-19 Results comparison

National	*Coastal area*	*Hinterland*
Growth (+), Wage (-), River(+)	Trade(+), wage(-), River(+)	Growth (+), Tech (+), River(+)

Table 5-20 The combination of regional advantage and effect

	Advantage	*Disadvantage*
Positive	• Trade (E) • River advantage (E)	• Growth (W) • River (W) • Tech (W) • Wage (E)
Insignificant	• Wage (W) • Technology (E) • Growth (E) • Road and Rail (E)	• Trade (W) • Road and River (W) • Wage (E)

Note: E indicate Eastern area, W indicate Western hinterland.

The three groups of regression provide a whole version of FDI determinants inside China (Table 5-18, 5-19). The nationwide estimation recognizes lower labour cost, foreign presence, GDP growth rate and river resource stimulate the FDI stock in China.

As summarized in table 5-20, east area has more trade business (open environment), advance technology, growing economy and rich transportation resource. While, lower wage is the advantage of hinterland. However, with limitation of technology development and good environment, the lower wage cannot attract the FDI into hinterland (the coefficient of technology is significant in the estimation for hinterland, the wage is not significant). On the other hand, if the wage level become lower in the eastern area, there will be more inward FDI.

Combined with the regional factors, there are four groups of the factors.

- The advantages with a positive coefficient indicates that the factor not only important for the competition between subgroups but also the essential advantages in the subgroups.
- The advantages with insignificant coefficient indicate that the factor supports the entry of FDI into the subgroup. However, it does not support the competitions inside the regions.
- Improve the disadvantages with positive coefficients promote the competitive capability of FDIs flows into the regions.

- The disadvantage with insignificant coefficients has less effect on FDI in the regions.

According to this, the conclusion is:

Firstly, trade and river transportation infrastructure are the essential competitive factors for the eastern provinces to attract foreign direct investment. However, trade has no significant effect on the competition in the hinterland.

The results are due to the geographic restrictions and history. Multinationals in the eastern regions have a long history to accept FDIs. The geographic advantages in transportation and harbors resource facilities the assembling and processing business for exporting. The eastern regions highly rely on its location advantages. The transportation facilities in the hinterland do not influence the competition in the region.

Secondly, the investment in the eastern area is restricted by one or more advantages of the regions, which includes, technology and economic growth. Once it fits the entry condition, the labour price dominates the competition in the eastern area. The investment into the hinterland is attracted by advantages in cheap labour resource. However, the foreign presence, technology and economic growth decide the competition inside hinterland.

In the eastern area, wage is a factor for multinational to reduce the production cost and reap the higher investment payoff. It is due to several reasons. Firstly, harbor and river resource support export-orientated FDI, which seeking cheap labours in the area. The hinterland is restricted from these type of FDI due to its geographic advantages. Secondly, the skill labours in the eastern area are abundant. The new influx of skilled labours in the area could not directly increase the employment of these labours. Therefore, the cheap labour attracts FDI into the regions.

On the other hand, FDIs in the hinterland do not have significant influence by wages. There are several explanations: Firstly, the hinterland is abundant by unskilled labour. The wage are relatively lower the eastern coast area. However, it has to reach the minimum wage line. There is a bottom line of wage competition. Secondly, the hinterland lacks skilled labours, which require a high payment. Multinational enterprises seek the skilled labour in hinterlands to support the production. The rise of labour quality in the multinational firm offsets the effect of labour price competition in the area. This leads to an insignificant effect in the hinterland.

The coefficient of technology and economy growth are positive in the hinterland but insignificant in the eastern area. Multinational firms in the hinterland look for technological supports. It is important for the provinces to compete with the other regions in the subgroup.

Low FDI presence in the hinterland has the positive coefficient. Multinational firms prefer to locate in the regions with relative FDI presence to get the necessary business support. This related the trade/openness effect. The eastern area has more experience in accepting the foreign direct investment. The business and policy environment are efficient to support the FDIs. However, the hinterland has less experience in environment construction. Foreign company presence is important to support FDIs in the hinterland.

From the results discussed above, one important point comes up. It is the entry condition in the eastern area is determined by geographic resource. Rich human resource, advanced technology level and higher foreign business presence are multinationals entry requirement of the multinational firms in the eastern area. While cheap wage level provide in the hinterland to attract FDIs. It is due to their regional characteristics, in particular, transportation resources and business environment. These geographic advantages do not change easily. An open and supportive economy environment is easier for the local economy to access international business opportunities, cooperation and advanced technologies. Therefore, multinational firms in the eastern area have more opportunity to cooperate with local enterprises, government and research institution.

However, the hinterland has less experience to attract foreign direct investment. The transportation resource cannot support trade-related FDI. Qualified human resources, advanced technology and foreign business presence are the scarce resource in the hinterland. Therefore, the competition inside the hinterland are determined by this regional scared resource and the competition in the eastern area is the purely wage cost.

5.7 Conclusions

The purpose of this chapter is to find the determinants of FDI distribution in mainland China with a set of explanatory variables based on the adjusted FDI model in the previous chapter. This study explored a methodological framework based on dynamic analysis through Arellano-Bond difference GMM and Blundell- Bond System GMM approaches.

The result found that the lower wages, domestic economy, foreign presence, and river infrastructure have influence in the location decision for inward FDI stock in China. Afterwards, a regional comparison found a unique trade effect in the coastal region and a technological effect in hinterland region.

The studies are meaningful to Chinese authorities in FDI policy. Firstly, the GDP growth rate was used to measure the local economy's development potential rather than the local economy. Local GDP itself can be proxies for the market size for FDI in China. However, this study treated GDP as the denominator to get the relative value of FDI and trade. To avoid the multicollinearity in data, GDP could not be used as an independent variable and take the market demand into account.

Secondly, this study has some practical significance in explaining the FDI determinants in China. In recent years, the Chinese government encourages foreign capital investment in the central and the western region by providing various incentive schemes such as tax benefits, and financing plan. However, the majority of the investment is still concentrated in the coastal area. Although, in general, the wage rates are relatively lower in the hinterland. There is still a gap for business investment. The foreign firms' presence in the hinterland is relatively less than in the coastal area. Hinterland needs long time to catch up the eastern area as it takes long time to construct the environment.

Thirdly, although cheap labour is one of the attractive factors for FDI stock in the coastal area, it does not have a significant coefficient in the hinterland. As the technological support is one of the factors need to be concerned by the government in the coastal area. As many multinationals tend to improve the service in Chinese market, they start to employ the location managerial team, establish local research offices and outsource the local productive materials. This may lead to more involvement of the skilled labour into the foreign enterprises. If skilled labour seeking investment mixed with the cheaper labour seeking investment, the coefficient of wage variables could be insignificant.

This study raises a research discussion. It is the entry condition for multinationals into the regions is determined by geographic resource. And it does not change easily.

Chapter 6 The Impact of Foreign Direct Investment on Chinese Trade Performance

6.1 Introduction

This chapter empirically studies the impact of FDI on Chinese international trade. The traditional international trade theories emphasize the reasons of international trade is comparative advantage. There are two types of comparative advantages. The first type is the natural comparative advantage includes technology, factor endowment which stimulate the inter industry trade (Ricardo, 1817; Heckscher, 1919; Ohlin, 1924). The acquired comparative advantage stimulates the intra-industry trade by specialised production and product varieties in searching for a larger scale of production (Krugman 1980, Lancaster, 1980, Helpman, 1981).

With the development of multinational enterprises, the influence of FDI on international trade has been discussed. The impact of FDI is based on the motivation of FDI. The inward market-oriented FDI can replace international import for final product, but support intermediate goods imports (Petri, 1994; Gary, 1998). The outward FDI can replace final product export but support export. The efficiency-seeking production affiliates, which seek cheap labour, will increase the volume of trade. The inward trade-seeking FDI motivated by the need for exporting activities, which will increase the international trade. Resource-seeking FDI suggests that multinational firm access to resources that are not available or that are less favourable (Nachum et al, 2000). The inward resource-seeking increase the export. Strategic asset seeking investment is less influence by factor endowment. This type of FDI has less influence on FDI.

The geographic distance is supposed to restrict the international trade. The U.S, the EU and Japan are most important trade partner with China. The enterprises from Japan have an advantage in geographic location then the MNEs from the other two regions.

This study explores the theories with empirical research in China. China has abundant labour input and has advantages in large production scale. However, the Chinese products do not contain high technology. Therefore, China is inclined to import high technology goods and export low technology products. The influx of FDI in China can change the motivation of Chinese trade. Multinational firms can transfer the intangible firm specific assets to China and produce in China through FDI channel than traditional final product exports. However, choice of production location is influenced by the geographical location.

The results of the empirical research are inconsistent for various country samples. Lipsey and Weiss (1984) found a positive relationship between US firms' output in foreign areas and US export to those regions. Blomstrom et al. (1988) found a positive relationship between FDI and export for US-Sweden firm. Pfaffermayr (1996) find a complementary relationship between FDI and export of Austrian manufacturing. Bayoumi and Lipworth (1997) found temporary impact on exports and permanent effect on imports for Japanese outward FDI. Pain and Wakelin (1997) found a negative effect of outward FDI and positive effect of inward FDI on exports for OECD countries.

The empirical research concerning FDI in China and trade relationship found a positive effect of inward FDI on both Chinese imports and exports (Wei, 2001). However, previous research has suffered from two problems. One is model constructing, the other one is on econometric approaches.

Previous researches apply the gravity model with country-pair data analysis (Liu et al 2001). However, the analysis on bilateral trade cannot reflect the impact of FDI activities on Chinese trade. There are two reasons: The first one is a small data sample. FDI source regions for inward FDI in China are limited to few countries. Therefore, a small sample can lead to bias in estimation. Secondly, Chinese trade partners are dispersed. However, due to a limited number of FDI resource regions, the small sample on bilateral trade cannot reflect the influence of inward and outward FDI on Chinese total international trade. The estimation could be biased. Thirdly, there is trade diversion between different trading partners. This cannot be captured in bilateral trade. Trade diversion occurs, when the increase of trading with a specific country leads to the exporting performance decreasing with third countries. To avoid this shortcoming in gravity models, the analysis in this study focuses on the aggregate trading of the country rather than the bilateral trading.

The econometric problems stem from the choice of econometric approach. Panel approach has been applied in the empirical research on Chinese bilateral trade data series. Cross-sectional observations are the Chinese FDI source economies. However, this study analyses aggregate trade with time series data. Panel approach does not fit. This chapter explores the relationship between FDI in China and international trade in China using an ARDL cointergration approach, which examines not only short-run but also long-run relationship between the variables. The advantage of the approach is that it allows a mixed integration order of variables.

This study explores the aggregate effect of FDI on Chinese international trade. It is very meaningful to examine the relationship between trade and FDI in China as China is a unique research object. Firstly, it is the world's largest FDI recipient developing country and it is also the main trade partner of the US, the EU, Japan and Russia, these being globally important economies. This study has reference value to the studies for regions, which already have or will have a business relationship with China. Secondly, China is generally viewed as an Asian export-oriented developing country where exports have a tentative relationship with FDI (Johnson 2006). The development of foreign funded enterprises in China is accompanied by the development of Chinese international over the past three decades (Chapter 2, table 2-13). The processed exports, which are highly related to export- oriented foreign direct investment, represent more than 40-60% of total international trade in China (Chapter 2, table 2-13). Exported-oriented FDI is one of the FDI types that the Chinese government has promoted (Chapter 2, section 2.2). This study could serve as an example for research on other export- oriented developing economies.

This study contributes the existing studies in following three respects: Firstly, this is the first study applied ARDL approach in time series data to explore both long-run and the short-run relationship between the variables. This approach solves the problem of various integration orders which allows a long-run cointegreation test. Secondly, the study explores the impact of FDI on import and export respectively. Chinese international trade is not balanced. The export volume is more than important and the net export keeps increasing in the last 30 years. The analysis takes import and export as dependent variables respectively, which could provide a clear view of Chinese international trade. Thirdly, the study has a more clear and precise definition of the explanatory variables.

The structure of this chapter is as follows: the first section after the introduction discusses the research model and the dataset used in this empirical work. Section 6.3 reports an econometric analysis of empirical research using the ARDL approach. Section 6.4 discusses the results. Section 6.5 is the discussion of the results. Section 6.6 concludes the findings.

6.2 The Granger Causality test

The results of Granger Causality test in Chapter 4 indicates the neither FDI stock in China or Chinese economy growth could not cause the aggregate China importing (Table 4-1). However, the results of the FDI from Japan and the United State find that the changes on FDI and the local economy drives the changes of their exports to China. This chapter indicates to explore the causality in detail for aggregate exports. The dependent variable includes the market demand and FDI stock. Furthermore, this chapter investigate the influence of FDI and work demand on aggregate Chinese exporting.

6.3 The model and variables

This section discusses the model construction and variable selection. Section 6.3.1 introduces the basic model. Section 6.3.2 discusses the expected effect of variables. Section 6.3.3 discusses the data series selection.

6.3.1 The basic model

The basic model includes both inward and outward FDI influence on export performance, which is expressed as below:

***X*=f (*FDISIN*, *FDISOUT*)** **(6-1)**

where *X* indicates exports from China, *FDISIN* and *FDISOUT* is the inward and outward FDI stock.

Pain and Wakelin (1997) develop the basic model by incorporating market demand and market competition factors. Both the world demand and competitive advantage are expected to stimulate exports from the home country. Competitive advantages are measured in two dimensions: financial and nonfinancial. Relative price measure the financial competitive factors. It captures the exports price gaps between the exporting countries and their main competitors. As long as the exporting prices of the home country increase, the price competitiveness decreases in the world market. Non-price competitiveness is measured by technical gap.

The model by Pain and Wakelin (1997), which is shown below:

***X*=f (*D, PR, TG, FDISIN, FDISOUT*)** **(6-2)**

where *X* indicates Chinese exports to the world, *D* indicates the world demand, *PR* is the relative price of home country exports. *TG* is the technology gap. *FDISOUT* and *FDISIN* indicate the outward and inward FDI from the exporting country. This study follows the analysis model by Pain and Wakelin (1997) on FDI influence on export. The specification for exports is shown:

$$X_{it} = \alpha_{oi} + \alpha_1 D_{it} + \alpha_2 PRX_{it} + \alpha_{3i} RQ_{it} + \alpha_4 FDISOUT_{it} + \alpha_5 FDISIN_{it} + e_{it} \quad \textbf{(6-3)}$$

PRX is the relative price of exports. *i* indicates the cross-section unit of country *i*, *t* is time. *e* indicates the error term.

However, the research on export cannot fully reflect international trade of China. On the quantity side, the export volume of China is much more than imports (Chapter 2, table 2-13). There is a large volume of net exports and international trade is hence unbalanced. On the quality side, Chinese export and import have different characteristics of trade pattern and product type (chapter 2, table 2-9 – table 2-12).

Furthermore, even regardless of the difference in volume and characteristics between Chinese export and import, the effect of FDI on export and import are different respectively. Market seeking inward FDI in China is expected to have a positive effect on Chinese imports but no effect on Chinese exports to third countries.

Therefore, this study includes import into research. The corresponding specification for imports is as follows:

$$M_{it} = \alpha_{oi} + \alpha_1 S_{it} + \alpha_2 PRM_{it} + \alpha_{3i} RQ_{it} + \alpha_4 FDISOUT_{it} + \alpha_5 FDISIN_{it} + e_{it} \qquad \textbf{(6-4)}$$

M indicates the Chinese imports from the world, *S* is the world market support, which is measured by the total world exported minus the exports from China. *PRM* measured the relative price of imports.

6.3.2 Variables

The aim of this section is to recognize the effect of explanatory variables in the specifications in Equation 6-4. The independent variables include market demand and supply, relative price, technology gap, inward and outward FDI stock in China.

6.3.2.1 Specification for exports

The variables to explain Chinese exports includes inwards and outward FDI stock, market demand, relative price and technology gap.

Inward FDI stock

The impact of inward FDI on export is determined by FDI purposes. Generally, inward marketing-seeking FDI does not have a significant effect on export, as the final products are targeting the Chinese market. However, export platform FDI has a positive effect on exports as the products are expected to be exported back to the home country or third countries. Previous empirical research supports the positive effect of inward FDI on Chinese trading (Swenson 2005).

Besides these direct effects, inward FDI influence exports through its impact on production resources in the host country. The first channel is capital support. FDI brings capital to the host country, which increases the capital available for Chinese production. This is supposed to raise Chinese exports indirectly. The second channel is a non-capital advantage in the form of new technologies (Zhang and Song 2000). Multinational companies bring firm – specific assets to the host economy in the form of technologies, management and marketing skills. This raises production efficiency of subsidiaries in the host country. Furthermore, it raises the productivity and production of local enterprises through technology spillover effects. However, whether these technologies can have a positive influence on Chinese production depends on the compatibility of the new technologies with the Chinese economy (Zhang 2006). Some untransferable technologies could abuse resources and bring the negative influence. The third factor is human resource. Multinational firms provide training to the workforce and managers in host country, which raise the labour productivities in the subsidiaries. Through the labour flows, the productivities of local firm increase. However, not all of the multinational enterprises in China provide proper training. The effect of foreign companies in China is still uncertain. The fourth factor is the exploration of new foreign markets. Multinational firms pave the way of Chinese production to new and larger foreign market. Domestic firms can then increase the exports through observing the activities of multinational firms (Haddad & Harrison 1993). However, the entry of multinational companies on the host country market also increases the competition. This may prove to be an obstacle to the expansion of local firms to expand share in the domestic market.

Previous empirical researches proved that inward FDI has a positive effect on Chinese exporting (Zhang and Song 2000, Zhang 2006). These studies believe that the linkages between export and inward FDI in China is very tentative and Chinese government attract foreign direct investment into China with the intention to promote exports. Therefore, the coefficient of inwards FDI stock is expected to be positive. The proxy for inward FDI in this study is inward foreign direct investment stock.

Outward FDI stock

The effect of outward FDI depends on the aim of investment as well as production stage. Marketing seeking FDI stimulates Chinese exports from domestic headquarters. However, resource seeking FDI does not have a direct effect on Chinese exports.

Furthermore, outward FDI influences Chinese exports through several indirect factors. The first factor is technological acquisition. The outward FDI which aims to acquire advanced technologies from foreign companies are supposed to raise the production efficiency of Chinese firms, as well as product quality. Therefore, this type of investment is expected to increase the export.

This type of ‘go global’ firm has been strongly supported by Chinese government. At the moment, about 20% of total Chinese outward FDI are in developed countries. The ‘primary’ determinant of this type investment is strategic asset seeking, which aims to acquire firm-specific assets of foreign enterprises to China (Deng 2007, 2009).

The second factor is market exploration. Market seeking FDI of Chinese multinational firms has been rapidly growing in developed economies (Buckley et al 2008, 2007; Deng 2004, Zhang 2003). This type of investment is motivated by exports support for domestic Chinese exporters in the host countries (Wu and Sia, 2002) and market exploration. This type of outward FDI is supposed to have a positive effect on Chinese exporting.

Previous empirical work found positive but insignificant results of outward FDI on Chinese exports (Liu et al 2005). The effect of the variables is supposed to be positive for Chinese exports in this study. Outward FDI stock is applied as the proxy for outward FDI.

Market demand

A growing foreign market stimulates the Chinese to new exports of normal products. This is expected to have a positive effect. However, the expansion of market demand has two meanings. The offensive meaning is to open a new foreign market as a growing foreign market. The defensive meaning is the liberalization of foreign markets. Challenging trade policies are a problem for Chinese exports. In particular, China is the world largest anti-dumping target economy due to low production costs in China. These policies limit the (defensive) market demand for Chinese exports.

Therefore, the effect of market demand is expected to be ambiguous for China. The studies use world exports as a proxy value to measure world market demand.

Competitive price

International trade theory shows how comparative advantages could stimulate international trade. China is generally viewed as a labour abundant country and hence has a comparative advantage in labour-intensive products. Labour-intensive products can be produced in China with low production cost. Thus, low production price stimulates Chinese exports.

Pain and Wakelin (1997) developed the two country model to a global scale. They argue that price competitive capability of Chinese products on the world market has to depend on the relative price level of its main competitors, which export the same products as Chinese firms or multinational subsidiaries in China. Therefore, lower Chinese price relative to its exporting competitors are expected to have more Chinese exports in the world market.

Technology Gap

The effect of the technology gap is expected to have a negative effect on Chinese exports. Being a labour intensive and technology- scarce economy, the increase in Chinese technological level raises Chinese productivity and stimulates Chinese exports. Therefore, the smaller the technology gap between the world and China indicating an increase in Chinese technology competitiveness in turn results in larger Chinese exports.

This study uses the difference between the world patent application number and Chinese patent application number as a proxy for the technology gap. The coefficient of the variable is expected to be positive.

6.3.2.2 Specification for imports

The factors to support imports to China includes inward and outward FDI stock, market supply, relative prices and technology gap.

Inward FDI Stock

The effect of inward FDI on imports to China depends on the production stage and intermediate goods type. Intangible intermediate goods do not have a significant effect on Chinese imports while tangible intermediate goods, especially in import – performance FDI, stimulate Chinese FDI.

Inward FDI influences Chinese exports through its indirect impact on production resources, which includes capital inflows, transfer of firm assets, development of human resources and export markets. However, the most of the effect comes from the supply side, which is not reflected in the imports. But the imports of multinational firms do have a demonstration effect for regional Chinese firms. Through the activities multinational enterprises, Chinese subsidiaries or even regional Chinese firms could access intermediate goods or production resources for a lower price or of better quality.

This study applies inward FDI stock as a proxy for inward FDI. The effect of inward FDI is expected to be positive.

Outward FDI stock

Same as for the effect on exports, the effect of outward FDI stock on Chinese exports depends on the type of investment. Market seeking or export seeking FDI does not influence Chinese imports. However, technology seeking FDI is expected to increase imports for its intermediate/final products. Resource seeking FDI, such as Chinese petrol in Australia, is also expected to stimulate import.

This study applies outward FDI stock as a variable. The effect of outward FDI stock in Chinese imports is ambiguous.

Product supply

Large supply in the market is expected to result in a higher consumption of product. Firstly, large supply reduces the price of a product. Secondly, large supply increases product differentiation. Therefore, this effect of market supply is positive. The study proxy uses world imports as a proxy value to measure world market supply.

Relative price

Generally, a higher price level in China compared to competitor’s price level who imports the same products is expected to have a positive effect on imports as the higher price level increases price tolerance. However, this effect is facing some challenges.

Firstly, trade barriers and exchange rate regimes distort the supply price between providers according to the relative trade or economic policies. Secondly, price discrimination by providers shuffles the price competition. Thirdly, the intra-firm trade by multinationals bypass the import price competition. Therefore, the effect of import price competition is ambiguous.

Technology Gap

The effect of technology gap is expected to have a positive influence on Chinese imports. As a labour intensive and technology-scarce economy, a larger technology gap indicates larger Chinese market demand for technology-intensive intermediate and final products. Therefore, the large the technology gap between the world and China, to the larger Chinese imports.

Like for the effect on exports, this study uses the difference between the world and China patent application as a proxy for the technology gap. The coefficient of the variable is expected to be positive.

Summarizing the discussion, the expected effect of the variables is listed as below:

$$X_{it} = \alpha_{oi} + \alpha_1 D_{it} + \alpha_2 PRX_{it} + \alpha_{3i} TG_{it} + \alpha_4 FDISOUT_{it} + \alpha_5 FDISIN_{it} + e_{it} \qquad \textbf{(6-5)}$$

with $\alpha_1 \succ 0, \alpha_2 \prec 0, \alpha_3 \prec 0, \alpha_4 \succ or \prec 0, \alpha_5 \succ or \prec 0$

$$M_{it} = \alpha_{oi} + \alpha_1 S_{it} + \alpha_2 PRM_{it} + \alpha_{3i} TG_{it} + \alpha_4 FDISOUT_{it} + \alpha_5 FDISIN_{it} + e_{it} \qquad \textbf{(6-6)}$$

with $\alpha_1 \succ 0, \alpha_2 \succ 0, \alpha_3 \succ 0, \alpha_4 \succ or \prec 0, \alpha_5 \succ or \prec 0$

6.3.3 Data Issues

This section discusses the data used in this empirical work. The dataset covers the annual FDI stock in China from 1980 to 2009, which is a period ranging from the beginning of FDI inflow to China to the latest available year. This study applies annual data series.

Inward and Outward FDI stock series

In the dataset, a series of FDI stock of inward investment is applied. The original dataset is from UNCTADSTAT and is provided in millions US$. To ensure the analysis works with a constant price level, Chinese GDP was deflated based on 1985 value to remove price inflation effects. The Chinese GDP deflator comes from the

IMF world economy outlook (WEO) database. The data series was converted into an index based on the original data level 1985 equal to 100. Furthermore, a logarithm of FDI data series (*LNFDIsin* and *LNFDISout*) was used to provide a smooth dataset (Figure 6-2 and 6-3).

Exports and imports

The data source of Chinese export and import values is the IMF direction of trade statistics provided in US dollars. The data series have been adjusted by Chinese GDP deflator based on 1985 to remove the influence of changes in the price level. Data series of real Chinese export and import values have been converted into an index with the value in 1985 equal to 100 and were used in logarithmic form (Figure 6-4 and6-5).

World demand and supply

The world demand in the original exporting model is measured by the total world imports minus Chinese exports. The supply is defined as the world total exports minus Chinese imports. The data covering world imports and exports come from the IMF direction of trade statistics. The data series of world demand and world supply have been adjusted using a world GDP deflator based on 1985. The world GDP deflator comes from the IMF WEO dataset. After conversion into index with base year 1985 equal to 100, the data series were transformed into logarithmic form (Figure 6-6 and 6-7).

Relative price index

IMF international financial statistics provide the real effective exchange rate measure (REER) for various currencies including the Chinese RMB. However, price competitiveness in the world market has been more significantly influenced by main competitors. The main source regions for Chinese imports are Japan, Taiwan, Korea and the EU (Appendix table A5-11, A5-12, A5-13). The main export destinations for Chinese products are Hong Kong, Unite States, the EU and Japan (Appendix Table A5-14,A5-15, A5-16). However, Hong Kong is the world’s main trade transition port. The main market for Chinese production are therefore the remaining destinations.

Considering the geographic location and trade value, this study chooses ASEAN countries as main competitors for Chinese exports and imports.

The data series used in this study took the traditional approach measuring the REER calculation. The first step is to get the real bilateral exchange rate (RBER) by $RBER = e\left(\frac{P*}{P}\right)$, *e* is being the nominal exchange rate in direct form, i.e. in units of Chinese RMB per foreign currency. $\left(\frac{P*}{P}\right)$ is the foreign price level in terms of domestic currency level. The data source of nominal exchange rates is the IMF international financial statistics for the data series of Chinese RMB, Indonesian Rupiah (IDR), Malaysian Ringgit (MYR), Philippine Peso (PHP), Singapore dollar (SGD), and Thai Baht (THB) quoted in SDR. The nominal rate is converted to Chinese RMB from each foreign currency. $\left(\frac{P*}{P}\right)$ is applied by the proxy of ratio of GDP deflator between foreign countries and China. The data source of the GDP deflator for each country is the IMF World Economic Outlook.

The REER of Chinese RMB to each ASEAN country data was indexed with the base year of 1985 equal to 100. The second step is to get the real exchange rate, which is equal to the sum of weighted RBERs. $REER = \sum_{i=1}^{5} w_i RBER_i$ with $\sum w_i = 1$. There are two relative prices due to the weights chosen. Relative Price on exports (PRE) sets w_i according to the export value out of total exports from ASEAN 5 countries. The relative price of imports (PRM) is calculated out of the imports from all ASEAN 5 countries.

REER is an index with the base year of 1985 equal to 100, *PRX* and *PRM* are the indices for imports and exports. *LNPRX* and *LNPRM* are the logarithms of the respective indices (Figure 6-8 and 6-9).

Technology gap

Most of the relevant research papers choose two proxies for the technology level (technology gap). One is to use the number of research expenditure or research staff.

The other is to use the number of patent applications or granted patents. Data collection on the variable is difficult, especially for the former one. The earliest data of these two proxies which Chinese State Statistics Bureau (SSB) can provide is from 1990. However, the available statistical data has limited number of observations, especially given the annual statistics. An alternative approach is to patent registrations in a global patent office. World Intellectual Property Organization (WIPO) provides the registration information of Chinese from 1984. However, the series has some missing data. OECD.stat provides figures from two important sources of patent office information: EPO (Europe Patent Office) and PCT (Patent Cooperation Treaty)[35]. The data series of registrations for Chinese residents in those two offices is from 1980 and 1983 respectively. The data series from the PCT is selected because it provides a wider world scope database. The data series spans from 1983 to 2007 (Figure 6-10).

The technology gap variable is measured by the rate of world patent registration number in terms of patent registration number of Chinese residents. The higher the data value, the larger technology gap between the world and China gap. The series has been transformed into logarithmic form.

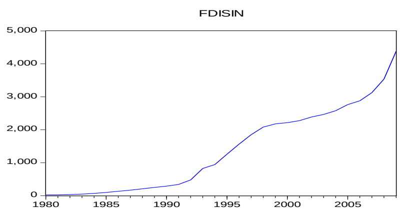


Figure 6-1 The real inwards FDI stock in China

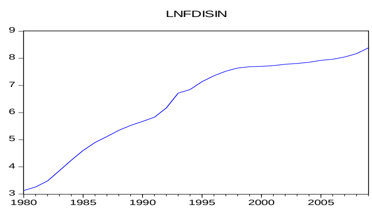


Figure 6-2 The real inwards FDI in logarithm

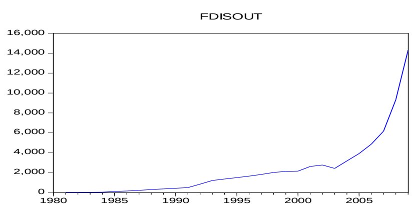


Figure 6-3The real outward Chinese FDI stock

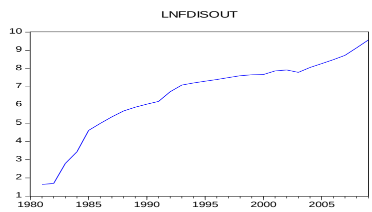


Figure 6-4 The outward FDI stock in logarithm

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[35] International Searching Authorities (ISA) and International Preliminary Examining Authorities (IPEA) of PCT includes: Austrian Patent Office (AT); Australian Patent Office (AU); National Institute of Industrial Property (BR); Canadian Intellectual Property Office (CA); State Intellectual Property Office of the People's Republic of China (CN); European Patent Office (EP); Spanish Patent and Trademark Office (ES); National Board of Patents and Registration of Finland ; Japan Patent Office (JP); Korean Intellectual Property Office (KR); Federal Service for Intellectual Property, Patents and Trademarks (Russian Federation) (RU); Swedish Patent and Registration Office (SE); United States Patent and Trademark Office (US); Nordic Patent Institute (XN).

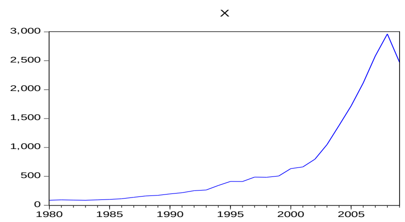

Figure 6-5 The real Chinese exports

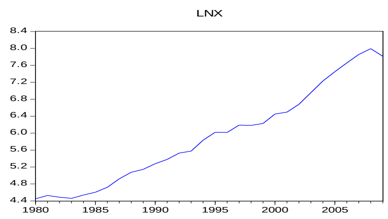

Figure 6-6 The real Chinese exports in logarithm

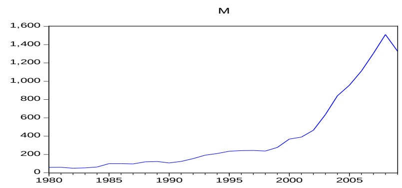

Figure 6-7 The real Chinese imports

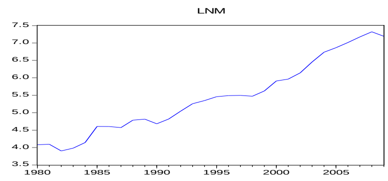

Figure 6-8 The real Chinese imports in logarithm

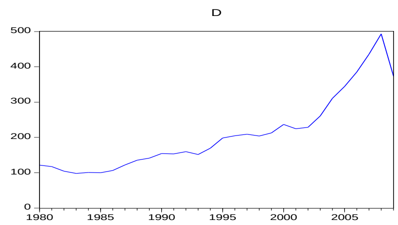

Figure 6-9 The real world demand

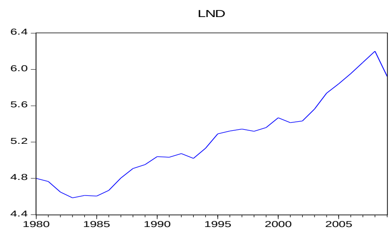

Figure 6-10 The real world demand in logarithm

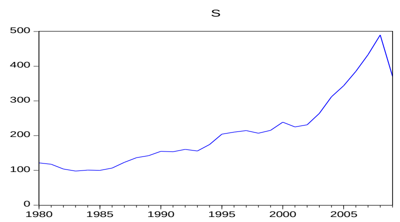

Figure 6-11 The real world supply

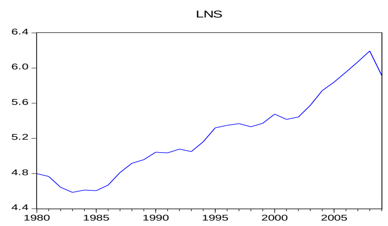

Figure 6-12 The real world supply in logarithm

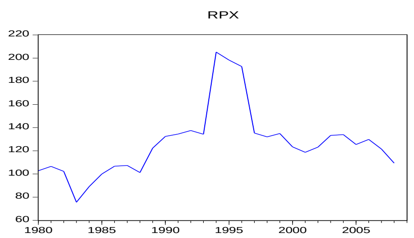

Figure 6-13 The relative index for exports

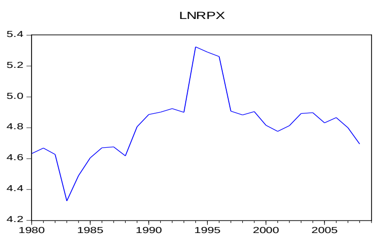

Figure 6-14 The relative exports index in logarithm

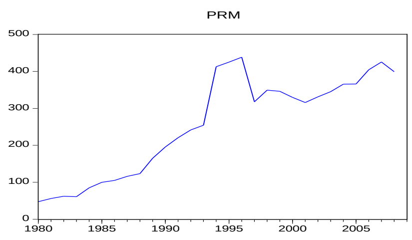

Figure 6-15 The relative index for imports

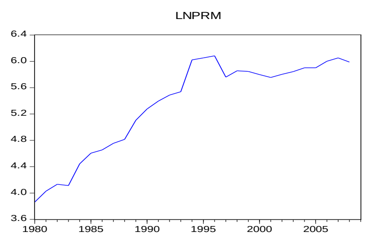

Figure 6-16 The relative imports index in logarithm

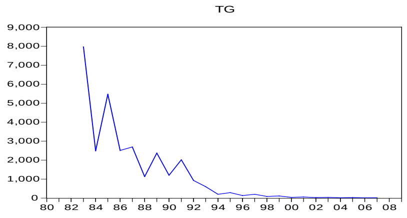

Figure 6-17 The technology gap

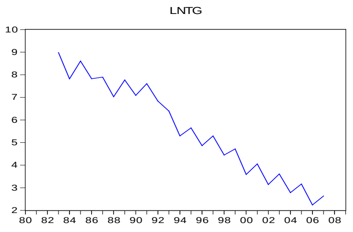

Figure 6-18 The technology gap in logarithm

6.4 Econometric results

This section explains the econometric process applied in this study. Section 6.4.1 discusses ADF and PP unit root test results to recognize integration order of the examined data series. Section 6.4.2 discusses econometric processes of the ARDL approach.

6.4.1 Unit root and integration

The econometric process therefore starts with a unit root test to recognize integration order of data series. This section applied two widely used unit root tests: ADF and PP test.

Table 6-1 The results of ADF and PP unit root test with *t*-statistic and *P*-value

Variables	*level*		*First difference*		*Second difference*	
(*INPT*)	ADF	PP	ADF	PP	ADF	PP
X	0.8958	0.7760	-3.1840**	-3.1209**		
	0.9940	0.9918	0.0317	0.0364		
M	0.4687	0.8564	-4.0648***	-3.8271***		
	0.9825	0.9933	0.0040	0.0072		
FDIsin	-2.8036*	-3.1641**				
	0.0706	0.0328				
FDisout	-4.1869***	-3.1984***				
	0.0031	0.0308				
D	0.0982	0.0065	-2.9554*	-2.5541		
	0.9600	0.9518	0.0517	0.1142		
S	0.0478	-0.0406	-2.9473*	-2.6563*		
	0.9557	0.9470	0.0526	0.0942		
PRX	-1.7819	-1.7556	-5.0153***	-5.0155***		
	0.3812	0.3937	0.0004	0.0004		
PRM	-1.6913	-1.6903	-5.1991***	-5.1996***		
	0.4245	0.4250	0.0002	0.0002		
TG	-0.2463	-0.8908	-4.2201***	-16.939***		
	0.9178	0.7734	0.0039	0.0000		
(*INPT+T*)	ADF	PP	ADF	PP	ADF	PP
X	-3.0440	-2.4758	-3.0485	-3.017918	-6.7380***	-6.9750***
	0.1401	0.3366	0.1377	0.1452	0.0000	0.0000
M	-1.7463	-2.5013	-3.9650**	-3.5858**		
	0.7010	0.3251	0.0223	0.0495		
FDIsin	-1.7660	-0.6800	-3.4104*	-3.4109*		
	0.6939	0.9653	0.0702	0.0702		
FDisout	-5.4410***	-2.7436		-4.3863***		
	0.0008	0.2282		0.0090		
D	-3.8803**	-3.1929		-1.9976		
	0.0267	0.1055		0.5773		
S	-3.2418*	-3.2426*				
	0.0963	0.0962				
PRX	-1.5804	-1.5611	-5.0035***	-5.1510***		
	0.7751	0.7826	0.0022	0.0015		
PRM	-1.3939	-1.3959	-5.2590***	-5.3650***		
	0.8405	0.8399	0.0012	0.0009		
TG	-3.4427*	-6.0467***				
	0.0713	0.0003				
None	ADF	PP	ADF	PP		
X	6.0159	5.5393	-2.0552**	-2.0443**		
	1.0000	1.0000	0.0402	0.0411		
M	4.0772	6.3701	-2.9375***	-2.9375***		
	0.9999	1.0000	0.0048	0.0048		
FDIsin	1.2172	2.7017	-1.2230	-1.0969		
	0.9388	0.9975	0.1976	0.2404		
FDisout	1.3592	1.9386	-2.0210**	-1.9219*		
	0.9524	0.9850	0.0433	0.0535		
D	2.1698	2.0112	-2.6911***	-2.6911***		
	0.9911	0.9873	0.0090	0.0090		
S	2.1631	2.0061	-2.6854***	-2.6854***		
	0.9909	0.9872	0.0092	0.0092		
PRX	0.0070	0.0452	-5.1179***	-4.9985***		
	0.6765	0.6889	0.0000	0.0022		
PRM	0.0005	0.0284	-5.3042***	-5.3090***		
	0.6744	0.6835	0.0000	0.0000		
TG	-3.2109***	-3.4909***				
	0.0028	0.0012				

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

The unit root test results for export data series (*X)* are not consistent. The test of regression with a constant *(INPT)* only and the regression without a constant and trend *(None)* recognize data series is stationary in the first difference, while regression with a constant variable and a trend (INPT+T) recognizes the variable is stationary in second difference. In a reduced form of the unit root test (Appendix Table A5-1), the trend coefficient is not significant in model with constant and trend, but the constant is stationary in the first difference test. In this case, export data series is recognized as stationary in first difference.

Summarizing the integration test above, *X*, *M*, *FDIsin*, *S*, *PRX*, *PRM* has the integration order of 1, *LNTG* has the integration order of 0. *FSIsout* and *D* have integration of 0 and 1 respectively. The variables for specification have mixed integration orders.

6.4.2 Econometric tests and explanations

The reported results of the Augmented Dickey Fuller (ADF) test and the Philips Perron (PP) test (Table 6-1) indicate that data series is a mix of *I(0)* and *I(1)* orders. Therefore, the ARDL approach has been applied in the estimation. The estimation equation has been adjusted as:

$$\begin{aligned}\Delta\ln(X_{it}) &= \beta_1\ln(X_{it-1})+\beta_2\ln(D_{it-1})+\beta_3\ln(PRX_{it-1})+\beta_4\ln(RQ_{it-1})+\beta_5\ln(FDIsOUT_{it-1})\\ &+\beta_6\ln(FDIIN_{it-1})+\sum_{i=1}^{n}\gamma_1\Delta\ln X_{it-j}+\sum_{j=1}^{m_2}\gamma_2\Delta\ln D_{i,t-j}+\sum_{j=1}^{m_3}\gamma_3\Delta\ln PRX_{t-j}+\sum_{j=1}^{m_4}\gamma_4\Delta\ln PQ_{i,t-j}\\ &+\sum_{j=1}^{m_5}\gamma_5\Delta\ln FDI\sin_{it-j}+\sum_{j=1}^{m_6}\gamma_6\Delta\ln FDIsout_{i,t-j}+\alpha_i+e_{it}\end{aligned} \qquad \textbf{(6-7)}$$

and

$$\begin{aligned}\Delta\ln(M_{it}) &= \beta_1\ln(M_{it-1})+\beta_2\ln(S_{it-1})+\beta_3\ln(PRM_{it-1})+\beta_4\ln(RQ_{it-1})+\beta_5\ln(FDIsOUT_{it-1})\\ &+\beta_6\ln(FDIIN_{it-1})+\sum_{i=1}^{n}\gamma_1\Delta\ln X_{it-j}+\sum_{j=1}^{m_2}\gamma_2\Delta\ln S_{i,t-j}+\sum_{j=1}^{m_3}\gamma_3\Delta\ln PRM_{t-j}+\sum_{j=1}^{m_4}\gamma_4\Delta\ln PQ_{i,t-j}\\ &+\sum_{j=1}^{m_5}\gamma_5\Delta\ln FDI\sin_{it-j}+\sum_{j=1}^{m_6}\gamma_6\Delta\ln FDIsout_{i,t-j}+\alpha_i+e_{it}\end{aligned} \qquad \textbf{(6-8)}$$

6.4.2.1 The influence on Chinese exports

This first step of the ARDL approach (software: *Microfit*) is to run an OLS regression to recognize the existence of a long - run relationship between variables with *F*-statistics. The first regression *(None)* includes neither intercept nor trend. The second regression *(INPT)* runs regression with an intercept but a trend. The third regression *(INPT+T)* contains an intercept and a trend. Akaike's Information Criteria[36] and Schwarz Bayesian Criteria are applied to select lag orders (Appendix Table A6-7).

The *F*-statistics of ARDL-OLS estimation are significant at 90% confidence level in most of the estimations, except for the first version of model for two- lag order (Table A6-7). This supports the existence of a long-run relationship between variables. Both the AIC and SBC chose the lag order (1,1,0,1,0,0) for relative variables (Appendix Table A6-8) .

[36] AIC=Tln|∑| +2N, BSC= Tln|∑| +Nln(T) ,where ∑ is the determinant of the variance/covariance matrix of the residuals, N is the total number of parameters estimated in the equations.

Table 6-2 The long-run coefficient by ARDL-VECM approach with maximum one lag

Long run		Short run	
Regressor	*Coefficient* *T-Ratio*	*Regressor*	*Coefficient* *T-Ratio*
FDISIN	-0.3030 -1.5802	dFDISIN	0.0682 0.4864
FDISOUT	0.0318 0.3045	dFDISOUT	0.0144 0.3250
D	0.4349 0.8823	dD	1.0284 4.7302
PRX	0.1006 0.6749	dD1	0.0455 0.6779
TG	0.0100 0.1580	dRPX	0.0045 0.1605
C	2.2821 1.0453	dTG	1.0320 1.4871
T	0.1588*** 3.4664	dC	0.0718*** 3.3567
		dT	0.0682 0.4864
		ecm(-1)	-0.4522 -2.2035
R-Squared		.85615	
R-Bar-Squared		.76984	
S.E. of Regression		.043109	
F-stat		12.7534[.000]	
Mean of Dependent Variable		.13477	
S.D. of Dependent Variable		.089856	
Residual Sum of Squares		.027876	
Equation Log-likelihood		49.5125	
AIC		39.5125	
SBC		33.4181	
DW-statistic		2.4206	

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

In the long-run estimation, the coefficient of inwards FDI stock is insignificant and negative at 90% confidence level, and indicates that a 1% increase of inward FDI reduces Chinese exports by 0.30%. However, the short-run estimation has a positive but insignificant effect. Outward FDI stock and relative price have a positive but insignificant influence on exports. In line with previous expectations, outward investment leads to exports of intermediate goods from the home country. Depreciation of the Chinese currency relative to the main export competitors does not lead to a reduction in Chinese products in the world market. The technology gap has a positive but insignificant coefficient. An increase of the technology gap increases Chinese exports. World demand has a positive but insignificant effect on Chinese exports. Chinese exports strongly follow the world market. It is the most important coefficient in the estimation.

Like the results in the long-run estimation, most of the coefficients in the short-run ARDL are not significant. *D* (world demand) is the only variable that has significant coefficient.

The variable inward FDI stock now deserves attention. It has an opposite effect in the short-run and in the long-run. Although the results are not significant, it still could reflect some relationship between FDI and international trade. In particular, there is a negative effect in the long-run, which is different to the previous theoretical expectation. Although market seeking FDI is not expected to have a positive effect on exports, export-oriented FDI stimulate exports. According to the product cycle theories, a production moves to a cheap resource region in the production mature stage, and final goods are then re-export back to the home country and other regions with high production costs. Therefore, exports value is supposed to increase with inward investment; especially the processing industry has an important share in the trade of manufactured goods (Chapter 2).

The main exporting market for Chinese products is Japan, United States and the European Union (Appendix Table A6-11 – A6-16). Except for Japan, the other economic regions are on different continents than China. The geographic distance is faraway. These regions are inclined to produce in neighboring countries with cheap production cost and re-export back to the home country rather than import from China should the exporting cost offset the production cost gap.

Secondly, the decrease of export value is due to the decrease of product prices. In the short term, export goods from China due to the inward FDI shift the supply curve to the right and, the supply is then larger than the demand. In the long-run, the market price decreases to reach a new equilibrium. The export value decreases in price-inelastic products. Therefore, the export value decreases in the long-run.

Thirdly, various financial and nonfinancial trade barriers rise due to the surge of Chinese exports. Inward FDI in China stimulates the short-run flow of Chinese products on the world market. Main countries influenced by Chinese exports have to protect domestic industries through various trade barriers, such as tariffs, trade quota and anti-dumping regulations. For instance, China is the largest Anti-dumping (AD) target economy with the number of total AD cases against China since 1995-2008 being 677, which is 3 times than the other important target economies of Korea, the US and Taiwan. These financial and non-financial policies may reap the financial profit of re-exporting by multinationals. This results in a negative coefficient in the long-run.

Table 6-3 Top 20 targets of AD investigations 1995-2008 (initiations)

Rank	*Target countries*	*No of case*
1	China	677
2	Korea	252
3	US	189
4	Taiwan	187
5	Indonesia	145
6	Japan	144
7	Thailand	142
8	India	137
9	Russia	109
10	Brazil	97
11	Malaysia	90
12	Germany	83
13	EC	69
14	Ukraine	61
15	South Africa	58
16	Italy	46
17	Singapore	44
18	Spain	44
19	Turkey	44
20	UK	44

Data source: antidumpingpublishing.com

Fourth, the infusion of FDI leads to structural changes of multinational subsidiaries in China, which further reduces the export in long-run. The Chinese government sets various economic policies to attract foreign direct investment (Chapter 2). However, it has been noticed recently that some multinational enterprises do not observe Chinese conditions for foreign direct investment. This increases pressure on Chinese domestic firms and further influences long-run Chinese exporting. Furthermore, since 2000, the China government has classified subsidiaries of multinational in China into four groups. The new policies support investment projects with high-/new-technologies (Chapter 2). This change limited the export from those multinationals with lower technological level and has reduced the Chinese export value in the long-run.

6.4.2.2 The influence on Chinese import

Regression with an intercept and a time trend (INPT+T) recognized a long-run relationship between the variables with maximum one lag order at a 99% confidence level (Appendix Table A6-9). Regression with no constant variable and trend (None) recognizes a long-run relationship between the variables in maximum two lag order at a 95% confidence level. The lag order (1,1,1,1,0,1) has been chosen due to its high confidence level and significant coefficients of the constant variable and the time trend. Furthermore, due to the small sample size, one lag order is superior to two.

Three variables are significant in the long-run: inward FDI stock, outward FDI stock and technology gap. Outward FDI is the only variable significant in the short-run. The outward FDI stock has a positive effect on imports, 1% increase in outward investment may lead to a 0.27% increase of imports.

Inward FDI stock is the most important variables as its coefficient value is larger than those of the remaining variables. The coefficient of inward FDI stock on imports is negative, which indicates that an increase of foreign investment reduces the Chinese imports. A 1% increase in inwards FDI stock results in a 0.56% decrease of imports. Although intra-industry trade rises with exported-oriented FDI for intermediate goods, the aggregate Chinese imports decrease with FDI accumulation in China. There are several reasons for that.

The first one is the substitute relationship between inward FDI and imports for market seeking multinational enterprises. FDI is an alternative channel to serve the new market. In particular, China has an abundant and cheap labour. Local production reduces cost and increases total profit. These explanations may be challenged as a multinational firm may import intermediate goods to China. However, intangible intermediate goods do not account into the import value by Custom. Although the EU and the USA are main resource regions of FDI, the value of Chinese imports from these regions is very small. This indicates that inward FDI may not necessarily raise imports of tangible intermediate goods.

Table 6-4 Estimated long-run coefficient by ARDL approach

Long run		*Short run*	
Regressor	*Coefficient* *T-Ratio*	*Regressor*	*Coefficient* *T-Ratio*
LNFDISIN	- 0.5699** -2.9789	dLNFDISIN	0.1831 0.8257
LNFDISOUT	0.2721* 2.0522	dLNFDISOUT	0.4128*** 2.9530
LNS	-0.4169 -0.9335	dLNS	0.6106 1.5110
LNPRM	0.0842 0.3446	dLNRPM	0.0589 0.3451
LNTG	-0.3139** -2.1849	dLNTG	-0.0929 -1.3670
INPT	8.8357*** 3.6418	dC	6.1809*** 3.2555
T	0.1164** 2.1819	dT	0.0814** 2.3974
		ecm(-1)	-0.6995*** -4.1260
R-Squared		.80466	
R-Bar-Squared		.62559	
S.E. of Regression		.080413	
F-stat		7.0615[.001]	
Mean of Dependent Variable		.13296	
S.D. of Dependent Variable		.13142	
Residual Sum of Squares		.077595	
Equation Log-likelihood		34.7571	
AIC		22.7571	
SBC		15.6888	
DW-statistic		2.7608	

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

The second reason is the substitute relationship between international resources and domestic resources. The indirect effects of FDI on location of Chinese capital, technology, human resources and resource supply accelerate the development of the Chinese economy. The increase of Chinese products stimulants the development of downstream industry, this reduces the imports from foreign countries.

The coefficient of outward FDI stock on imports is positive at 90% significance level in the long-run relationship and positive at 99% significance level in the short-run relationship. This indicates that a higher outward FDI stock leads to an increase in

Chinese imports. The effect depends on the aim of investment, for instance, resource seeking FDI raises the imports.

The technology gap has a positive influence on imports. It indicates that the smaller gap between world technology and Chinese technique reduced Chinese imports from the world. Therefore, Chinese imports are technology – oriented. The larger the gap, the more imports to China. With the improvement of Chinese technologies, the imports decrease.

One noticeable fact is that most Chinese imports come from main inward FDI source economics in East Asia (Table 6-5, Appendix Table A6-11-A6-13). South Korea and Taiwan are among the top 10 FDI source countries to China. Imports and inward FDI have a substitution relationship which may be due to geographic proximity.

Table 6-5 shares of Chinese trade partner

Panel A: Export market of Chinese products										
China	HK	Taiwan	India	Japan	Korea	US	Russia	ASEAN	EU	rest
1995	0.2862	0.0253	0.0027	0.1468	0.0859	0.0932	0.0049	0.0983	0.1131	0.1483
1996	0.2742	0.0220	0.0029	0.1432	0.0870	0.1093	0.0041	0.1004	0.1136	0.1474
1997	0.2670	0.0218	0.0041	0.1337	0.0903	0.1078	0.0052	0.1034	0.1175	0.1545
1998	0.2508	0.0263	0.0044	0.1191	0.0518	0.1477	0.0043	0.0713	0.1461	0.1826
1999	0.2254	0.0268	0.0048	0.1211	0.0648	0.1601	0.0022	0.0708	0.1495	0.1766
2000	0.2146	0.0298	0.0050	0.1209	0.0666	0.1528	0.0036	0.0758	0.1453	0.1891
2001	0.2138	0.0213	0.0071	0.1200	0.0601	0.1568	0.0058	0.0740	0.1478	0.1991
2002	0.2090	0.0210	0.0094	0.1064	0.0648	0.1699	0.0060	0.0755	0.1381	0.2059
2003	0.1935	0.0220	0.0114	0.1037	0.0642	0.1663	0.0093	0.0732	0.1430	0.2228
2004	0.1614	0.0314	0.0143	0.0948	0.0709	0.1684	0.0111	0.0880	0.1451	0.2258
2005	0.1366	0.0266	0.0181	0.0866	0.0748	0.1762	0.0141	0.0917	0.1521	0.2374
2006	0.1202	0.0266	0.0217	0.0722	0.0780	0.1755	0.0155	0.0914	0.1649	0.2495
2007	0.0965	0.0220	0.0270	0.0614	0.0796	0.1515	0.0204	0.0976	0.1842	0.2802
2008	0.0748	0.0178	0.0255	0.0593	0.0932	0.1392	0.0249	0.0977	0.1686	0.3238
2009	0.0812	0.0135	0.0289	0.0635	0.0621	0.1433	0.0176	0.1030	0.1546	0.3498
Average	0.1870	0.0236	0.0125	0.1035	0.0729	0.1479	0.0099	0.0875	0.1456	0.2195
Panel B: Imports source regions of Chinese products										
China	HK	Taiwan	India	Japan	Korea	US	Russia	ASEAN	EU	rest
1995	0.0959	0.1863	0.0031	0.2426	0.1426	0.0381	0.0492	0.0587	0.0780	0.1548
1996	0.0788	0.1823	0.0068	0.2136	0.1589	0.0530	0.0535	0.0601	0.0763	0.1702
1997	0.0699	0.1917	0.0068	0.2150	0.1753	0.0331	0.0528	0.0622	0.0763	0.1697
1998	0.0635	0.1999	0.0072	0.2106	0.1830	0.0281	0.0526	0.0703	0.0773	0.1602
1999	0.0540	0.1944	0.0072	0.2144	0.1817	0.0336	0.0486	0.0704	0.0805	0.1639
2000	0.0499	0.1859	0.0083	0.2045	0.1742	0.0416	0.0418	0.0633	0.0871	0.1850
2001	0.0475	0.1852	0.0100	0.1993	0.1658	0.0397	0.0370	0.0524	0.1049	0.1953
2002	0.0425	0.1926	0.0135	0.1958	0.1381	0.0303	0.0351	0.0547	0.1114	0.2212
2003	0.0320	0.1630	0.0244	0.1781	0.1332	0.0395	0.0396	0.0563	0.1146	0.2587
2004	0.0275	0.1532	0.0178	0.1965	0.1410	0.0279	0.0364	0.0541	0.1177	0.2643
2005	0.0227	0.1501	0.0197	0.1928	0.1398	0.0295	0.0392	0.0506	0.1278	0.2670
2006	0.0208	0.1426	0.0158	0.2050	0.1338	0.0141	0.0434	0.0529	0.1371	0.2780
2007	0.0172	0.1285	0.0180	0.1968	0.1149	0.0142	0.0467	0.0517	0.1399	0.3188
2008	0.0140	0.1112	0.0138	0.2167	0.1143	0.0173	0.0550	0.0533	0.1529	0.3064
2009	0.0098	0.0908	0.0208	0.1831	0.1057	0.0375	0.0457	0.0556	0.1399	0.3566
Average	0.0431	0.1638	0.0129	0.2043	0.1468	0.0318	0.0451	0.0578	0.1081	0.2313

Data source: Chinese

6.5 Summary and discussion

This study explores the relationship between FDI and international trade based on the extended specification by Pain and Wakelin (1997). FDI is expected to have different effects on exports and imports. Furthermore, Chinese exports and imports show differences in value, trade type and trade aim. Therefore, the study explores the export and import respectively.

This chapter employs a new methodological framework based on the ARDL approach to explore the effect of market, competition and the FDI effect on FDI stock in China as the approach allows the mixture of integration orders in the time series dataset, which suit the data series from China.

The study finds that other important characteristics are that Chinese exports and imports have different focus. Chinese exports are marketing-oriented as market demand is the only variable which has a significant coefficient on exports, although the effect is short-term. On the other hand, imports are more technology-oriented as the technology gap has a positive effect on imports (Table 6-6 and Table 6-7).

This study has an insignificantly negative effect on exports. However, Previous researches found a positive effect of Inward FDI on export in China (Wei., 2001). This is due to the different econometric approach. There are several important economic explanations to support the insignificant coefficient of this study. Firstly, the products from multinational firms have a competitive relationship with the Chinese products. Therefore, the exports from multinationals replace the Chinese exports to serve the foreign market. Secondly, tariffs, anti-dumping policy and similar trade obstacles restrict the exports of products from subsidies in China to the main markets (Section 6.4.2.1).

On the other hand, a significant negative effect on imports. It is different with the previous research which found a positive effect of inward FDI on Chinese imports. There are some explanations to support the result of this study. Firstly, inward FDI has a strong substitute relationship with imports to China. In particular, FDI is a more direct form of technology and knowledge transfer than imports. The investment from the US and EU transfer the intangible technology through FDI rather than trade. The home production is replaced by Chinese production due to the high transportation cost. Secondly, there is a substitute relationship between foreign imports and Chinese domestic products. Inward FDI is an important channel for Chinese subsidiaries or Chinese local firms to access advanced technologies. With the development of Chinese technology, imports are substituted by Chinese domestic products with a relatively lower cost (Section 5.4.2.2)

The relative price, measured by the real effective exchange rate, does not have a large influence on Chinese trade, which may be due to the currency peg policy, as Chinese Yuan and the currencies of most ASEAN countries are pegged to US dollars.

The international trade is highly influenced by its geographic location. One of the important characteristics of Chinese international trade is that its export markets and import source are geographically located in different areas (Table 5-8). The main Chinese export markets (by trade value) are the United States, the European Union and Japan. The first two markets are located far from China. While, the main import regions are Japan, South Korea and Taiwan, all these three regions located in East Asia together. The results of this study explain these characteristics. Due to the high transportation cost from the EU or US to China, multinational firms from these regions choose to establish production in China. Therefore, the Chinese imports from these regions are substituted by the intangible technology. However, the imports from nearby neighbour have been less influence by the transportation cost.

In summary, there are three main findings of the study. First, the main Chinese export destination markets are different from import supplier regions. Second, the aims of Chinese exports and imports are different. Chinese exports are market-oriented, while, imports are technology oriented. Third, the capability of FDI to promote international trade of China has been influenced by geographic location.

Table 6-6 Long-run influence

exports		*Imports*	
variables	*effect*	*variables*	*Effect*
FDISIN		FDISIN	-
FDISOUT		FDISOUT	+
D		S	
PRX		PRM	
TG		TG	+

Table 6-7 Short-run influence

exports		*Imports*	
variables	*effect*	*variables*	*Effect*
FDISIN		FDISIN	
FDISOUT		FDISOUT	+
D	+	S	
PRX		PRM	
TG		TG	

Table 6-8 Outward investment stock in China (1980-2009) (unit: US dollar million)

region	*FDI stock*	*percentage*	*countries*	*FDI stock*	*percentage*
Total	245,755.38	100%	Total	245,755.38	100%
Asia	185,547.20	76.50%	Japan	692.86	0. 28%
North America	5,184.70	2.11%	South Korea	1,217.80	0. 50%
Europe	8,676.78	3.53%	USA	3,338.42	1.36%

Data source: Chinese statistics Bureau (Chinese Statistics Year Book 2009).

This study has a considerable practical meaning. Chinese and other emerging exports-oriented economies aim to raise domestic GDP through export using their low labour cost. With the inward FDI inflow to China, China has become the “factory of the world”. However, this study has found that inward FDI cannot benefit Chinese exports. Furthermore, the competitive price does not lead to the increase in exports anymore as there is large export surplus but also because Chinese is the world leader as an anti-dumping target. Various trade barriers limit Chinese exports. Outward FDI is generally recognized as a more efficient approach to bypass trade barriers to an import market. This type of investment has been encouraged by the Chinese government recently. However, this study found the outward FDIs are not sufficient to support export either, but this may be due to their current small volume.

Chapter 7 The Impact of Foreign Direct Investment presence on Chinese Regional Economic Growth

7.1 Introduction

Since the late 1970s, China has implemented a series of economic reform, which include the liberalization trade and attracting foreign capitals. Accompanied with the economic reform, the Chinese economy has exhibited a continuous growth in gross domestic productivity. Especially during 1991-1996, Chinese GDP and GDP experienced a continued growth with an annual growth rate of 10% (Chapter 2, Table 2-16). The economic reform successfully promoted the development of the Chinese economy.

Traditional theories has notice the spillover effect of FDI on the host countries' economies. As FDI supports the capital accumulation (Rosenstein-Rodan 1943, 1961), technical progress (Solow 1956, 1957, Abramotitz 1956) and human capital development, it is considered as an effect to promote the economic development of FDI recipient countries, especially the developing countries.

However, the positive spillover effect of competition is under the assumption of 'absorptive ability' of Chinese economy. The capability of the host country promoting its economy is limited by its economy condition. If local technology, infrastructure and investment environment lag too far behind home country, local firms may not undertake a catch up process and benefit from the foreign presence (Cantwell 1989, 1995).

Previous empirical studies have found a positive effect of inward FDI in Chinese economy growth (Graham et al. 2001, Wei et al. 2001, Zhang 2001, 2006, and Yao 2006). However, the related studies suffer from an econometric approaches application. There are two types of data applied in previous studies: a cross-section approach (Zhang 2001, 2006) and a panel approach (Graham et al. 2001, Wei et al. 2001, Zhang 2001, 2006, Yao 2006). All the studies used the province level data as the cross-section unit. The limitation of this approach is that the sample size is quite small, which is not sufficient to support cross-section estimation as the administrative unit at the province level is less than 33. The alternative approach is panel data. But the previous studies explore the static effect of foreign direct investment on Chinese economic development through traditional OLS, Fixed Effects and Random Effects approach (Graham et al. 2001, Wei et al. 2001) and assume the variables are exogenous. The interaction of multinational firms and level firm lead the spillover effect in a dynamic process. The static approach has its research limitation.

This study not only applies the Arellano-Bond difference GMM and but also the Blundell- Bond System GMM approaches, which are more efficient in dealing with small data samples.

One phenomenon in the Chinese economy is that economies in the eastern area and the western regions are in different development stages. There are gaps between these two regions in annual GDP, average wage, human resource, technological level and transportation facilities value of eastern province is generally larger than the western area (Table 2-17). These factors have different impact of FDI in these two regions (Chapter 7). This chapter compares the effects of FDI and trade in these two regions.

Another contribution of this study is that it explores the factors of inward FDI stock in the coastal and hinterland respectively after the nationwide research, as the impact of FDI and international trade is supposed to be different in two ways. Firstly, the presence of multinationals in the coastal area is much concentrated than the western hinterland. Previous studies set eastern coastal areas as a geographic dummy variable in the nationwide estimation. The results indicate that this geographic location has a significant positive coefficient (Yao, 2006). Secondly, the eastern and the western provinces are in different stages of development and have different resource endowments. The impact of FDI is limited by the regional initial economic level and supportive resource, such as market competition. Through the comparison, the study explores the main factor which stimulates the economic development in different economic background. It helps to investigate the absorptive capacities of Chinese economy.

This chapter contributes to the existing studies in three sectors: Firstly, the study applied both Arellano-Bond difference GMM and Blundell- Bond System GMM approaches in panel data to explore the dynamic effect of the variables for auto-correlation problem. Secondly, the study has a larger data sample in the econometric analysis in the period of 1995-2006. Thirdly, the study includes the sub-region estimation: the eastern coastal area and the western hinterland.

The structure of the chapter is as follows: section 7.2 will discussed the causality test result of the interrelationship between FDI in China, International trade and Chinese economic growth. Section 7.3 discusses the research model of FDI determinants and dataset in the empirical work. Section 7.4 reports econometric analysis results of national-wide data panel through GMM approaches. Section 7.5 reports the economic analysis results of sub-region panels. Section 7.6 discusses the estimation research and concludes the study.

7.2 The causality test

The results of Granger Causality test in Chapter 6 finds that both the FDI in China and Chinese international trade drives the future change of Chinese economy (Table 6-1). The causality has been proved in the subgroup test, except that the FDI stock in the hinterland does not have significant result on the local economy development (Table 6-2 and 6-3). This chapter investigate the effect of FDI and international trade on regional economy with concern the labour and capital resource.

7.3 The model and variables

There are three parts in this section. Section 7.3.1 explains the specification construction. Section 7.3.2 explains the effect of variables. Section 7.3.3 discusses the data series.

7.3.1 Model construction

The specification of this study stems from the original model by Barro and Sala-I-Martin (1995, Chapter 12) is as follows:

$$\dot{Y} = \alpha_0 + \alpha_1 FDI + \alpha_2 FDI * H + \alpha_3 H + \alpha_4 y_0 + \alpha_5 X + \varepsilon \qquad \textbf{(7-1)}$$

Y Indicates growth of regional economy, *FDI* is the FDI flow, *H* represents human capital, *X* represents other policy and control variables. y_o is the initial local GDP per capita.

This basic model emphasises the impact of four main factors. Firstly, it emphasises the importance of FDI and human capital on the regional economic growth. Secondly, it points out the importance of an initial economic level for further development. Thirdly, the model set the variables *X*. This keeps the model flexibility for variable adjustment in empirical works. Borensztein et al (1997) implied control variable and policy variables into the empirical estimation for 69 countries.

Zhang (2001) extended the model incorporating the different characteristics of labours: skilled and unskilled labour, and capital: normal capital and FDI investment. Secondly, he argues that both FDI inflows $\left(\frac{I_F}{Y}\right)$ and FDI stock $\left(\frac{F}{Y}\right)$ have different influence on regional economy growth. Therefore, the model includes two the variables. The estimated model as below:

$$\dot{Y} = \alpha_0 + \alpha_1 \dot{L} + \alpha_2\left(\frac{I}{Y}\right) + \alpha_3\left(\frac{I_F}{Y}\right) + \alpha_4\Delta\left(\frac{F}{Y}\right) + \alpha_5 y_0 + \alpha_6 H + \alpha_7 H\Delta\left(\frac{F}{Y}\right) + \alpha_8 y_0 + \varepsilon \qquad \textbf{(7-2)}$$

where $\dot{Y}$ is growth rate of real GDP, $\dot{L}$ is the growth rate of population, $\left(\frac{I}{Y}\right)$ is domestic investment rate to GDP, $\left(\frac{I_F}{Y}\right)$ is annual FDI inflow in terms of local GDP, $\left(\frac{F}{Y}\right)$ represents regional FDI stock in terms of regional GDP, y_0 represent logarithm of initial local GDP, H is human capital, y_0 is province initial level economy level.

This study develops the model by Zhang (2006) by incorporating an extra explanatory variable into the specification, which is international trade (it is measured as the sum of imports and exports). International trade is, generally, an important factor in stimulating the growth of local economy as it facilitates the technology creation and transfer (Sachs and Warner, 1995) from multinational firms to domestic firms. Previous researches (Wei, 2001 ; Yao, 2006) imply trade as the independent variables in the specification for economic growth in China and found a positive coefficient of trade and local economic growth rate of GDP per capita.

The specification distinguishes the different effect of skilled and unskilled labour, FDI and domestic investment, normal international trade and international trade by multinational firms.

The second difference between this specification and Zhang (2006) is that this study only applies the FDI stock in the model but not inflows. There are several reasons to remove FDI inflow. Firstly, both FDI stock and FDI inflow are commonly used proxy for FDI. It is not reasonable to put the variables in the equation, which may lead to collinearity problem. Secondly, these two variables in the same specification in the model reduced the explanation capability for both variables. Thirdly, this study focuses on the long-run effect of FDI on economy, FDI stock is more stable than FDI inflow data series, therefore, the specification includes FDI stock.

$$\dot{Y} = \alpha_0 + \alpha_1 \dot{L} + \alpha_2 \left(\frac{I}{Y}\right) + \alpha_3 \left(\frac{I_F}{Y}\right) + \alpha_4 y_0 + \alpha_5 H + \alpha_6 \left(\frac{Trade}{Y}\right) + \varepsilon \qquad \textbf{(7-3)}$$

To emphasise the influence of foreign direct influence on the Chinese domestic economic growth, this empirical study analyses of the influence in equation 7-4. The explanatory variables include labour growth ($\dot{L}_{it}$), human capital (H_{it}), normal investment $\left(\frac{I}{Y}\right)_{it}$, international trade value of regions $\left(\frac{Trade}{Y}\right)_{it}$, regional FDI stock $\left(\frac{I_F}{Y}\right)_{it}$ and $\left(\frac{Trade_F}{Y}\right)_{it}$. However, the overall international trade variable $\left(\frac{Trade}{Y}\right)_{it}$ is highly related with international trade from foreign firms $\left(\frac{Trade_F}{Y}\right)_{it}$. This may cause further collinearity problem. Therefore, the estimation is divided into three sub-regressions in equation 7-4. The First regression explores the influence of domestic capital investment. The second is to explore the foreign trade influence. The third regression is to explore the influence of foreign investment stock and foreign trade by multinationals in China.

$$\dot{Y}_{it} = \alpha_0 + \alpha_1 \dot{L}_{it} + \alpha_2 H_{it} + \alpha_3 \left(\frac{I}{Y}\right)_{it} + \alpha_4 \left(\frac{Trade}{Y}\right)_{it} + \alpha_5 \left(\frac{I_F}{Y}\right)_{it} + \alpha_6 \left(\frac{Trade_F}{Y}\right)_{it} + \varepsilon_{it} \qquad \textbf{(7-4)}$$

with three restrictions of variables for three cases.

Restriction 1: $\alpha_4 = \alpha_5 = \alpha_6 = 0_{it}$

Restriction 2: $\alpha_5 = \alpha_6 = 0$

Restriction 3: $\alpha_3 = \alpha_6 = 0$

7.3.2 Variables

This study includes the FDI stock, domestic investment, skills and unskilled labours, international trade and international trade by multinational firms and initial regional economy level as the main factor to stimulate regional economy in China.

FDI stock

Whether FDI can stimulate the development of the host country's economy is ambiguous. Firstly, According to the basic Cobb-Douglas production function, the output is determined by three basic factors: capital input, labour input and technology level. Foreign direct investment as a capital input direct increase local economy, contributing to the development of the Chinese economy as China is a capital scarce country with the 1.34 billion population[37]. The inflow of the capital increases the production resource and lead to an increase of the final output.

Furthermore, FDI does not only bring the capital, but also transfers the new technology and management skills to the host country (Romer, 1986; Sala-I-Martin, 1996). As Ownership-Location-Internalization model emphasis firm specific asset of multinational, the influx of foreign direct investment accompanied with technological knowledge spillover over to the recipient country. Local firms acquire the new technology through imitation, skills acquisition, competition and export (Gőrg and Greenway, 2004).

Thirdly, FDI provides necessary skill training for the workforce, which raises labour quality. Through the labour flows, these high skilled labours are transferred to regional firms, raise the productivity of location firm (Gőrg and Greenway, 2004).

Fourthly, the new market competition brought by multinationals to the host country could reduce the inefficiency of the local economy. However, competition, on the other hand, also presses the development space of Chinese domestic firms. To avoid this situation, the Chinese government has to implement a series of policy to support the project of producing new-/High Technology.

The previous empirical study found the positive impact of foreign investment on the Chinese domestic innovation (Cheung and Liu, 2004), but not on the industry productivity (Liu 2002). Therefore, the influence of *FDI* is not clear.

[37] Data source: Chinese statistics bureau by 1st July 2009.

International Trade

International trade by both local firms and multinational subsidiaries are expected to promote the development of regional economies. Firstly, the most direct influence of international trade on the economy, it facilities the regional firms to access better production resources, in particular the scare resource in the foreign market. Secondly, international trade raises the work opportunities and improve the employment in the host country. Thirdly, international trade is generally viewed as one of the important channels to transfer the advanced technology from trade partners to host economy (Gőrg and Greenway, 2004). Lastly, international trade general is expected to accelerate the openness of domestic economy, which are expected an increase of domestic productivities.

However, international trade has also a negative effect on regional economies, particularly for the developing economy as China. As the market adjustment function has not matured, it is easy to be distorted in the world economy. Firstly, Chinese enterprises suffered from antidumping cases and trade barriers. This raises the production cost and profit loss. Secondly, the new work opportunities of international trade distort the labour market structure. Especially, some multinational firm with assembling and processing trade abuse the cheap unskilled labour in China. This limits the human resource development. Thirdly, the opening of the Chinese market raises the competition between domestic firms.

The effect of international trade of multinational firms is ambiguous. However, previous research recognizes that international trade has a positive effect on Chinese economy growth (Wei, 2001 and Yao, 2006).

Unskilled and skilled labour

The Cobb-Douglas production function treats physical capital and labour force as main determinants. The growth of labour $\dot{L}_{it}$ and human capital present the unskilled labour and skilled labour contribution to output, which have a positive effect on domestic economic development.

However, unemployment has a negative effect on the region's economy. China is a labour abundant country. The unemployed labour consumes the regional economic resource, which disturb the development. Wei et al. (2001) discovered a negative effect of labour growth.

Fixed capital

Domestic fixed investment is expected to have a positive effect on regional economic growth. Firstly, investment is one of the important production inputs to directly raise the regional productivities. Compared with FDI in China, Chinese domestic investments have much larger weight in the total national investment. It is the most important capital resource. Secondly, as with FDI, Chinese capital supports the high technology innovation and workforce training. This, further, raises domestic productivities.

Yao (2000), Wei et al. (2001), and Zhang (2001) found a positive effect on domestic investment in the domestic economy growth.

Therefore, the research model of the foreign investment equation in the following form:

$$\dot{Y}_{it} = \alpha_0 + \alpha_1 \dot{L}_{it} + \alpha_2 H_{it} + \alpha_3 \left(\frac{I}{Y}\right)_{it} + \alpha_4 \left(\frac{Trade}{Y}\right)_{it} + \alpha_5 \left(\frac{I_F}{Y}\right)_{it} + \alpha_6 \left(\frac{Trade_F}{Y}\right)_{it} + \varepsilon_{it} \qquad \textbf{(7-5)}$$

$$\alpha_1 \succ or \prec 0, \alpha_2 \succ or \prec 0, \alpha_3 \succ 0, \alpha_4 \succ or \prec 0, \alpha_5 \succ or \prec 0, \alpha_6 \succ or \prec 0_{it}$$

7.3.3 Data series

The dataset applied in the estimation covers 28 administrative units in mainland China over the time period 1995-2007. As there are 22 Chinese municipal provinces, three municipality cities [38] and five autonomous regions, which are Inner Mongolia,

[38] The municipality cities are Beijing, Tianjin, and Shanghai. The 5 autonomous regions are Inner Mongolia, Guangxi, Ningxia, Xinjiang and Tibet.

Guangxi, Ningxia, Xinjiang and Tibet. All these administrative units are simplified as “provinces”. Chongqing is an extra municipality city created on 14 March 1997, which was a sub city in Sichuan province. To keep the consistency of data, in this estimation, the data series for Chongqing is added into the data series of Sichuan province. Furthermore, as Qinghai and Tibet could not be included as the data series are not stable.

The main data source is from the Chinese Statistics Year Book (in various years from 1996 to 2008) from the Chinese State Statistics Bureau (SSB) and with the reference by Chinese investment reports (in various years from 2002 to 2007).

The growth rate of real regional GDP per capita

The growth rate of real regional GDP per capita is used as the proxy for the dependent variable $\dot{Y}$ (measured by $\dot{Y}_{it} = \frac{\ln Y_{it} - \ln Y_{i,t-1}}{\ln Y_{i,t-1}}$). The real local GDP per capita is created by the nominal local GDP after the adjustment for inflation[39]. The growth rate is taken based on the logarithmic form of the real regional GDP. Due to the separation of Chongqing and Sichuan Provinces, the data series in Sichuan Province after 1997 is weighted by the population of two provinces, which is measured as below:

$$\ln Y_{new} = \ln Y_{sichuan} * \left(\frac{L_{sichuan}}{L_{sichuan} + L_{chongqing}} \right) + \ln Y_{chongqing} * \left(\frac{L_{chongqing}}{L_{sichuan} + L_{chongqing}} \right)$$

where Y_{new} is the new GDP per capita of Sichuan Province in the data sample, $Y_{sichuan}$ and $Y_{chongqing}$ is the original GDP per capita for these two provinces. $L_{sichuan}$ and $L_{chongqing}$ is the population of the provinces.

The growth rate of regional population in logarithm

[39] This study applied the accumulated CPI index as the deflator for inflation. The index in 1995 is equal to 100.

The growth of population in logarithmic form is proxy as is the proxy for the growth rate of regional labour $\dot{L}$, it is measured by $\dot{L}_{it} = \dfrac{\ln L_{it} - \ln L_{i,t-1}}{\ln L_{i,t-1}}$.

Human capital (skilled labour)

The proxies for the human capital (H_{it}) were measured in different methods in previous literatures. Borensztein et al (1997) used the average years of the male secondary schooling. Zhang (2001, 2006) argues that although the schooling year of labour force is a best measure of human capital, but the data series are not complete in China, he applied the secondary school enrolment in the total population as the human capital. Wei et al (2001) applied the secondary school and high education enrolment to the total labour force as the proxy for human capital. This empirical estimation measure the human capital as the higher education enrolments in logarithm form in term of total population in log form.

Domestic Investment

The domestic investment influence, $\left(\frac{I}{Y}\right)_{it}$, is measured by the local domestic investment in fixed asset to GDP. The $\left(\frac{I_F}{Y}\right)_{it}$ data series is the rate between the real FDI stock in logarithm and real provincial GDP in logarithm.

Regional FDI stock

As the data source (SSB) measured the realized FDI annual inflow (I_F) in US dollar, it has to be converted the data series to Chinese Currency Yuan by multiplying the annual average exchange rate Yuan/Dollar[40]. The FDI stock data series is captured in two steps. First is to get the real FDI inflow by the nominal FDI in Chinese Yuan

[40] the exchange rate is source from various year of Chinese Statistics Yearbook

adjusted by regional CPI[41]. Second step is to use the FDI stock in 1995 as the basic value and add the real FDI inflow to get the real FDI stock for various years.

International trade

International trade of province and international trade value of the foreign funded enterprises in the regions are original reported in US dollar by the Chinese State Statistics Bureau. They have to be converted to Chinese Yuan by multiplying the exchange rate. The rate and take the real trade value in logarithm in terms of regional GDP in logarithm in terms of regional GDP in logarithm.

7.4 Econometric results

OLS Pooled, Fixed Effect and Random Effect are widely applied in static panel data analysis. (The results by OLS, FE and RE approaches are reported in Appendix Table A7-1, A7-2). However, for the dynamic panel data analysis, these approaches may face the problem of the correlation between independent variables with the error term (Appendix Chapter 1).

GMM approach is an alternative approach solving the correlation problem in dynamic panel data as apply the difference and level form of dependent variables as an instrument as long as it does not correlate with the current error term. This study applies the GMM model into the estimation with the support by OLS, FE and RE approach.

7.4.1 Endogeneity test

To avoid the auto-correlationship problem with the traditional approaches, GMM approach is necessary support the data analysis. The first step of GMM approach is to recognize the endogenous variable and exogenous variables. A system exogeneity

[41] the accumulated CPI was applied index as the deflator for inflation. The index in 1995 is equal to 100

tests (command xtivreg2 in STATA) are performed to measure whether the endogeneity test could be converted into exogenous variables. The *chi* – statistics of domestic investment are significant at 99% confidence level. This rejects the null hypothesis. Therefore, which indicates the variables cannot be treated as exogenous variables (Table 7-1). While, the *chi* – statistics on skilled and unskilled labour could not reject the null hypotheses, therefore, which indicates these labour variables can be converted as the exogenous variables. Therefore, domestic investment is treated as the potential endogenous variable and leaves labour as the exogenous variables.

Table 7-1 System Exogeneity Tests

Variables	*Exogeneity test*	*P value*
L	0.384	0.5353
H	0.659	0.4171
I/Y	77.081***	0.0000

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level.

7.4.2 Dynamic estimation

GMM approach is applied in this study. “Small” option is applied to the regression, “robust” option is applied to avoid the heteroskedasticity in the panel data. Labour and Human capital are treated as exogenous variables. System GMM and difference GMM are applied.

The coefficient in two-step GMM is similar as one-step GMM. Table 7-2 report one step GMM regression results for the economic growth model with no effect by FDI and trade. The results by second-step GMM are reported in Table A7-3 in the Appendix.

The coefficient of lagged dependent variables in one-step system GMM with constant is 0.28 which is slightly below the coefficient of OLS pool and RE but higher than the coefficient in FE model. System GMM without constant variables is 0.30 slightly higher than the coefficients in the OLS, FE and RE regression. Coefficient in difference is 0.14 which is between the up-bias OLS, RE regression and slightly higher than the FE regression (Table A7-2 in the appendix).

Furthermore, system GMM (hereafter, GMM-sys) not only includes that difference independent variable as the instrument but also the independent variables in lagged form as an instrument, which is more reliable for the small sample. In this case, system GMM results are superior to the rest of the regression. Due to the coefficient of constant variable is insignificant in the first column, the results of one-step system without constant variables in the second column are chosen (Table 7-2).

Table 7-2 one-step GMM regression

variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2787***	5.25	0.2970***	5.84	0.1479**	2.35
L_{t-1}	-0.1356**	-2.30	-0.1360**	-2.30	-0.0783	-1.47
H_{t-1}	1.1608	1.55	2.1492***	3.85	5.0310***	6.18
$(I/Y)_{t-1}$	0.0152	1.05	-0.0048	-0.94	0.0097	0.57
C	-0.6115	-1.32				
No of observation	280		280		224	
Number of instruments	113		112		93	
F-statistics	51.74		657.09		28.02	
Prob > F	0.000		0.000		0.000	
AR(1)	-3.60		-3.64		-3.34	
Pr > z	0.000		0.000		0.001	
for AR(2)	-0.13		-0.12		-0.54	
Pr > z	0.900		0.901		0.589	
Sargan test of overid. restrictions	232.25		226.16		102.42	
Prob > χ^2	0.000		0.000		0.157	
Hansen test of overid	26.02		26.09		26.52	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	25.26		23.24			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	0.75		2.86			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	26.68		25.62		25.70	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.67		0.47		0.82	
Prob > χ^2	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

The diagnostic test further supported the results of one-step system GMM without constant variables. The *F*-statistics proved that coefficient in overall variables is significant. AR (2) a statistic rejected the secondary correlationship between explanatory variables with the new error term. Hansen test rejected the overriding problem in the regression. Difference in Hansen test could not reject the exogenous variable selection.

The results could not recognize a positive coefficient of domestic investment (variables: I/Y) on economy growth, which is different from the expected. However, the coefficient of labour growth is negatively correlated with foreign investment, which indicates the more labour resource in the region, the lower the GDP per capita increase. Human capital density has a positive effect on the economic development.

The results found a negative coefficient of population growth with the growth of GDP per capita. A 1% increase in population growth rate (variable: L) leads to 0.14% decrease in GDP per capita. The results are same as Wei et al. (2001). It may relate to the huge Chinese population base which provides that labour pool in production, however, the over-abundant labour resource lead to the marginal decrease in regional economic development.

The skill labour density with the proxy by higher education student enrolment in terms of total regional population has a significant positive effect. The high density of skilled labour would promote the regional development. 1% increase in density lead to 2.27% of GDP per capita growth (variables: y_0).

The restriction 1 of equation 7-4 allows exploring the influence of basic production resource of labour and capital inputs. The further explore the influence on open economy, trade and FDI influence is discussed in restriction 2 and restriction 3 of the equation 7-4. Restriction 2 allows exploring the international trade on Chinese economy, which includes the independent variables of lag GDP growth, population growth, higher skill labour density, total investment and international trade. Restriction 3 allows to explore the further influence of FDI influence and international trade related to multinational firms in China, in equation 7-4 was applied. Appendix Table A7-4 and A7-5 reported the one-step GMM results of the rest under restriction 1 and 2. The diagnostic test supported the efficiency of one-step GMM estimation results. The system exogeneity tests found that FDI stock and international trade by multinational firms with domestic investment are endogenous variables while two types of labour are exogenous. To concise the text, this study only report the one-step system-GMM results under the three different restriction in Table 7-3.

The results under restruction 2, is the ame as the estimation under restruction 1, population growth variable have a negative effect on economic growth (second column, Table 7-3). Human capital density exhibits an insignificant positive effect. However, one-step GMM without constant variables and difference GMM obtained a significant positive coefficient on skilled human capital density.

The estimation recognized a positive coefficient on total investment. 1% of investment increase stimulates regional GDP per capital growth rate increase by 0.29%. Same as expected, as the capital scare country, the increase of capital indicates the growth of the economy.

International trade (variables: Trade/Y) has an insignificant negative coefficient in the regression. It is same as previous expectation. Although international trade supports the domestic economy through market expansion, resource access, employment and economic openness. But also regional economy has to take the negative effect of international trade. This leads the empirical

Population has a negative effect in domestic GDP growth, human capital exhibit a positive effect. A 1% increase in human density, raise the regional GDP per capita.

In the extimation under restriction 3, the coefficient of FDI variables is positive, which indicates an increase in regional FDI stock stimulates the regional economy (third column, Table 7-3). The positive effect of FDI stock is larger than the negative effect. However, international trade volume by foreign-funded enterprises has a negative effect on regional economic development. This indicates the native effect on are more obvious than positive.

Table 7-3 One-step GMM estimation results for coastal area

Variables	*Ristriction 1*		*Ristriction 2*		*Ristriction 3*	
	System GMM		*System GMM*		*System GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2970***	5.84	0.2902***	5.54	0.2770***	5.95
L_{t-1}	-0.1360**	-2.30	-0.1433**	-2.55	-0.1713***	-1.63
H_{t-1}	2.1492***	3.85	1.7902***	3.43	1.2213**	5.40
$(I/Y)_{t-1}$	-0.0048	-0.94	0.0004	0.08		
$(Trade/Y)_{t-1}$			-0.0028	-0.80		
$(I_f/Y)_{t-1}$					0.0075**	0.60
$(Trade_f/Y)_{t-1}$					-0.0059***	-2.23
No of overvation	280		280		110	
Number of instruments	112		171		101	
F-statistics	657.09		858.04		997.27	
Prob > F	0.000		0.000		0.000	
AR(1)	-3.64		-3.58		-2.66	
Pr > z	0.000		0.000		0.008	
for AR(2)	-0.12		-0.09		-0.18	
Pr > z	0.901		0.926		0.855	
Sargan test of overid. restrictions	226.16		282.37		155.36	
Prob > $\chi2$	0.000		0.000		0.000	
Hansen test of overid	26.09		25.64		10.61	
Prob > $\chi2$	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	23.24		25.57		10.61	
Prob > $\chi2$	1.000		1.000		1.000	
Difference (null H = exogenous):	2.86		0.06		0.00	
Prob > $\chi2$	1.000		1.000		1.000	
Iv						
Hansen test excluding group:	25.62		25.64		10.61	
Prob > $\chi2$	1.000		1.000		1.000	
Difference (null H = exogenous):	0.47		0.00		0.00	
Prob > $\chi2$	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

7.5 Estimation for the eastern coast and the western hinterland estimation

As discussed in section 7.1, FDI and international trade are supposed to have different effects on economic development due to the eastern coastal area and the western hinterland of China are in different economic levels, resource endowment and multinational presence. It is necessary to explore the impact of these variables separately.

To compare the effect of FDI and international trade in regional economic growth, this section divides the national dataset into two groups: provinces in eastern coastal areas, and provinces in the western hinterland. The coastal area subgroup includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Shandong, Fujian, Guangdong and Hainan these 11 provinces and special cities. The rest 17 provinces are allocated into the hinterland subgroup.

The same economic approach process in section 7.5 is applied to two sub-group dataset. System endogeneity test recognizes data series of human capital density and unskilled labour as the exogenous variables in GMM estimation. Appendix Table A7-6, Table A7-7 and Table A7-8 reports the one-step GMM estimation for coastal dataset, while Table A7-9, Table A7-10 and Table A7-11, reports the GMM estimation for the hinterland. To concise the text, this study only report the one-step system GMM results under the three different restriction for east regions in Table 7-4 and for west regions in Table 7-5.

The diagnostic tests t, which includes the *F*-statistics, Second auto-regression (AR2), The Hansen test and Difference – in-Hansen test, recognized the efficiency of the regression and support the estimation results.

The estimation results in the coastal area are consistent with population growth rate. The coefficient of labour growth is in the range of -0.08 to -0.15. This indicates a 1% increase in labour growth rate slows down the growth of regional economic development by 0.15%. This is same as expectation. If the abundant labour resource in China cannot be transferred in the production input, it would be an economic burden for the regional economy.

Human capital is the most important variables in all three estimation for coastal areas. The coefficients are larger than investment and trade variables. This indicates the development of eastern areas rely on the skilled labour and technology improvement.

Table 7-4 One-step GMM estimation results for coastal area

Variables	*Ristriction 1*		*Ristriction 2*		*Ristriction 3*	
	System GMM		*System GMM*		*System GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.3109***	4.76	0.2902***	5.54	0.2986***	3.19
L_{t-1}	-0.1723***	-3.22	-0.1433**	-2.55	-0.1458**	-2.45
H_{t-1}	1.1960**	2.93	1.7902***	3.43	1.6766***	4.15
$(I/Y)_{t-1}$	0.0028	0.74	0.0004	0.08		
$(Trade/Y)_{t-1}$			-0.0028	-0.80		
$(I_f/Y)_{t-1}$					0.0071*	1.80
$(Trade_f/Y)_{t-1}$					-0.0084	-1.55
No of overvation	110		110		121	
Number of instruments	89		89		118	
F-statistics	13.93		13.93		853.52	
Prob > F	0.000		0.000		0.000	
AR(1)	-2.63		-2.63		-2.00	
Pr > z	0.009		0.009		0.045	
for AR(2)	-0.06		-0.06		-0.25	
Pr > z	0.955		0.955		0.804	
Sargan test of overid. restrictions	152.40		152.40		117.40	
Prob > $\chi 2$	0.000		0.000		0.369	
Hansen test of overid	10.13		10.13		8.39	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference-in-Hansen tests	0.00		0.00			
Level Hansen test excluding group:	1.000		1.000		8.39	
Prob > $\chi 2$	10.13		10.13		1.000	
Difference (null H = exogenous):	1.000		1.000		0.00	
Prob > $\chi 2$	0.00		0.00		1.000	
Iv	1.000		1.000			
Hansen test excluding group:	10.13		10.13		8.39	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference (null H = exogenous):	0.00		0.00		0.00	
Prob > $\chi 2$	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

The foreign direct investment(variable I_f/Y) have a positive effect on regional economic development in the coastal area. In particular FDI not only bring the capital, but also bring the technology spillover effect. However, the coefficient of domestic investment (variable I/Y) is not significant. However, FDI stock has a negative effect on regional economic growth, although the coefficient is only 0.01.

Both the overall international trade (variable: Trade/Y) and international trade by multinational firm (variable: $Trade_f/Y$) do not have a significant effect on regional economic development in the coastal area. The positive effect of international trade offset the negative effect. On the other hand, the international trade has a positive effect on the ecoomy growth in the hinterland. International trade appears significant positive. A 1% increase in trade would stimulate regional GDP per capita increase by 0.03%. This indicates the positive effect on international trade is larger than the negative effect. The international trade by foreign enterprise has not been recognized by the estimation.

Labour variable is negative in the coastal area. However, it is insignificant in the hinterland.

Table 7-5 One-step GMM estimation results for west hinterland area

Variables	*Ristriction 1*		*Ristriction 2*		*Ristriction 3*	
	System GMM		*System GMM*		*System GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2626***	3.89	0.2883***	4.19	0.3309***	4.37
L_{t-1}	0.0278	0.19	-0.0927	-0.63	0.0328	0.20
H_{t-1}	2.9574***	3.20	1.8607**	2.30	3.1674***	4.49
$(I/Y)_{t-1}$	-0.0106	-1.29	-0.0189**	-2.20		
$(Trade/Y)_{t-1}$			0.0293**	2.53		
$(I_f/Y)_{t-1}$					-0.0098*	-1.90
$(Trade_f/Y)_{t-1}$					0.0005	0.05
No of overvation	170		170		187	
Number of instruments	108		138		167	
F-statistics	370.84		324.54		235.78	
Prob > F	0.000		0.000		0.000	
AR(1)	-3.17		-3.14		-2.82	
Pr > z	0.002		0.002		0.005	
for AR(2)	-0.13		-0.35		1.39	
Pr > z	0.895		0.723		0.164	
Sargan test of overid. restrictions	166.82		198.98		179.74	
Prob > $\chi 2$	0.000		0.000		0.161	
Hansen test of overid	13.22		14.54		10.16	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	13.22		11.69		10.16	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference (null H = exogenous):	0.00		2.85		0.00	
Prob > $\chi 2$	1.000		1.000		1.000	
Iv						
Hansen test excluding group:	13.83		15.31		10.16	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.61		-0.77		0.00	
Prob > $\chi 2$	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

7.6 Summary and discussion

Eastern coastal provinces contain the advantages in physical and human capital resource, trade and local economic growth. While the hinterland has cheap labour cost. The development of both the eastern and the western regions rely on its human capital and physical capital and economic growth.

Human and physical capitals are the most important factors to stimulate regional economic growth. Particularly in the eastern area, coefficient of human capital is much larger than the rest variables in all estimation. China lacks the high technology and skilled labour resource, human capital is supposed to stimulate the investment. (Table 7-6, 7-7, 7-10). The factor endowment difference between the coastal area and hinterlands is relatively small for both human capital and domestic investment.

Table 7-6 Statistical summary of variables

	Panel A: coastal			*Panel B: hinterland*		
Variable	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.
y0	154	3.833954	.1698263	238	3.456993	.111976
L	132	.1663709	.3169146	204	.0695449	.2132529
H	143	.5287452	.0848561	221	.4883448	.0814052
(I/Y)	121	57.10088	4.108695	187	55.10565	4.096783
(Trade/Y)	143	42.10934	9.526636	221	33.74136	3.64319
(I_f/Y)	154	92.07404	5.643572	238	78.1173	6.798645
($Trade_f$/Y)	143	88.65594	8.110837	221	65.39393	6.518247

Table 7-7 Advantage resource comparison

Coastal area	*Hinterland*
Unskilled and skilled labour, fixed investment, international trade, FDI stock, international trade by multinational firm. Initial economic level	none

Table 7-8 comparison of the coefficients by GMM estimation in three groups

	National	Coast	Hinterland
Y_0	+	+	+
L	-	-	
H	+	+	+
(I/Y)	+	+	-
(Trade/Y)			+
(I_f/Y)	+	+	-
($Trade_f$/Y)	-		

Table 7-9 Results comparison

National	*Coastal area*	*Hinterland*
Growth (+) unskilled labour (-), human resource(+), investment (+), foreign investment (+)	Growth (+), unskilled labour (-), human resource(+), investment (+), foreign investment (+)	Growth (+), human resource(+), investment (+), international trade (+), foreign investment (-)

Table 7-10 The combination of regional advantage and effect

	Advantage	Disadvantage
Positive	• Human capital (E), • Economic growth (E) • Domestics investment (E) • Foreign investment (E)	• Human capital (W), • Economic growth (W) • International trade (W)
Insignificant	• International trade (E) • Trade of MNEs (E)	• Trade of MNEs (W) • Unskill labour (W)
Negative	• Unskill labour (E)	• Foreign investent (W) • Domestics investment (W)

Note: E indicate Eastern area, W indicate Western hinterland.

However, the advantage resource does not only have effect on regional economic development, but also brings the negative effect. The disadvantage does not indicate the limited resource restrict the regional development.

Labour growth is significantly negative in the eastern regions, but insignificant the FDI investment in the western hinterland. This may due to two main reasons. First is the different economic structure. China has over abundant unskilled labour but also short skilled labour. The hinterland economy is easier to accept the unskilled labour. Therefore, the coefficient is insignificant. While eastern coastal provinces have low capability to accept over-abundant unskilled labour as the industrialization level is higher. The second is due to migration caused by income gap. There is a wage gap between the coastal area and the hinterland (Chapter 6, Table 6-20). A large volume of unskilled labour migrates to coastal for higher income. This leads to a large labour gap between these two regions (Table 7-9). The population growth rate in the coastal area is more than twice as the rate in the hinterland. The migration to coastal area creates unemployment and obstacles the regional economic development.

Foreign direct investment stock has a positive effect in the coastal area but a negative coefficient in the hinterland.

FDI is expected to promote regional economy through capital introducing, technology spillover, human resource training, and employment improving (Section 7.3.2). Particularly in the coastal area, there is a large volume of unskilled labour, multinational firms raise more job opportunities for these labour as multinational firms are stimulated by cheaper labour cost (estimation results in Chapter 4).

However, whether foreign direct investment could successfully stimulate regional economic need to satisfy the pre-condition, which is competition capability of local firms. Chinese firms in the coastal area have rich experience in international business and are more competitive with the multinational firms in the area. Therefore, the competition rise by multinational enterprises stimulates coastal economic growth. However, the enterprises in the hinterland are less developed. The competition may lead to more pressure for the hinterland firm. Therefore, there is a joint-venture form, a less independent form of investment, is more common in hinterland rather than other foreign investment pattern in the hinterland (Chapter 2).

The coefficient of international trade is insignificantly negative in the coastal area. However, it is positively related with hinterland economy growth. Multinational firm and international trade have a substantive effect in the hinterland. Same as FDI, international trade could stimulate the regional economy in technology spillover, employment opportunity increase. However, the competition press of international trade on domestic firm is less as the local firms are under the protection by financial and non-financial trade barriers.

As summarized in table 7-10, east area has advantages in human capital, labour, physical capital, and trade. While, the hinterland has no advantages. FDI can stimulate the development of the eastern coastal economy, rather than the hinterland economy. The main reason in the absorptive capacity in the hinterland in quite low, the competition by multinational firms squeezes the development of local enterprise.

7.7 Conclusion

The importance of inward FDI and international trade are two import channels to stimulate the host country's economy. This study contributes to the literature in investigating the impact of multinational firm and international trade to Chinese economic development.

The estimation recognizes unskilled and skilled labour, fixed investment, international trade, FDI stock, international trade by multinational firm influence Chinese economic development. Afterwards, comparison was taken to discuss the impact of these variables in both the coastal area and the hinterland.

This chapter has three three main findings. Firstly, the results proved that FDI presence and multinational trade can stimulate the regional economy in the coastal area of China. The impact of FDI in the hinterland is recognized negative. It is caused by the competitive capability of domestics firm. The impact of foreign direct investment and international trade on Chinese economic development influence its economic level. Secondly, the international trade and FDI have substitute relationship in the hinterland. This is due to the lower competition capability of firms in the hinterland. Thirdly, human resource is the most important factor to promote regional Chinese development.

This study is meaningful to regional FDI development policy in China in several points. Firstly, the Chinese government has made effect to promote Chinese regional economy recently, especially, in the western hinterland. How to select a proper way to promote the regional economy is an important topic for the hinterland area. This study point out the growth path of the coast area does not fit properly the hinterland economy. Coastal economies are successfully promoted by multinational enterprises' involvement. However, this model could not apply into the hinterland. The scale of foreign investment and trade volume in the hinterland are much smaller than the coastal area. The competitiveness of firms in eastern regions is much higher than the ones in the hinterland. This study found that the development of hinterland needs a more protected environment. Therefore, the mild policies, such as "Go to the West", which aim to attract the human capital and domestic physical capital flow to hinterland suit hinterland development.

Furthermore, why Chinese economic growth could not reflect directly in labour income? It is an important discussion recently. This empirical study can help to answer the question. Firstly, Chinese GDP increase does not directly come from unskilled labour, but from domestic capital, skilled labours, FDI and international. Therefore, the increase of GDP is not supposed to increase the unskilled labour income. Secondly, the impact of FDI and international offset each other. It depends on the business competitiveness of Chinese domestic firms.

Chapter 8 Conclusion

8.1 Introduction

The thesis intends to explore the interrelationship between international trade, economic growth and inward FDI in China by utilising the dynamic economic approach. This study finds three interrelationships are influenced by the geographic location. It reflected in two types of factors. The first one is the transportation cost. The other is the transportation facilities and business openness support.

In order to investigate the national level effect, ARDL model has been proposed in the first two empirical chapters. This approach allows the variables with different integration orders.

The other two empirical chapters apply the GMM-diff and GMM-sys approach for panel data in regional research. The approach allows the autoregression in the variables.

8.2 Findings

On the national level research, the geographical factor reflects in transportation cost. The main findings include

- The determinants of inward foreign direct investment in China are different across the various types of FDI. The impact of market size and exports is influenced by the geographic location (Chapter 4).

Market effect is supposed to be positive on FDI. Due to the scale of economy, multinational firms intend to invest into regions with high market demand. Such as large Chinese and US market size has positive effect on FDI flows from US to China. It is possible to have negative home and host market effect (Chapter 5). The geographic location facilitates the multinational firm in Japan to move the business and production into China in its domestic economic depression period.

The geographical location influences the exports effect on FDI (Chapter 5&6). Due to the high transportation cost, such as the firms in the U.S., which is far away from China, prefer to serve the Chinese market through FDI. This replaces the final goods exports to China and lead to a negative coefficient in export. On the other hand, the neighbouring country, Japan has a position coefficient of the exports and the advantages allows the firms involve in the assembling and processing business by using cheap Chinese labours.

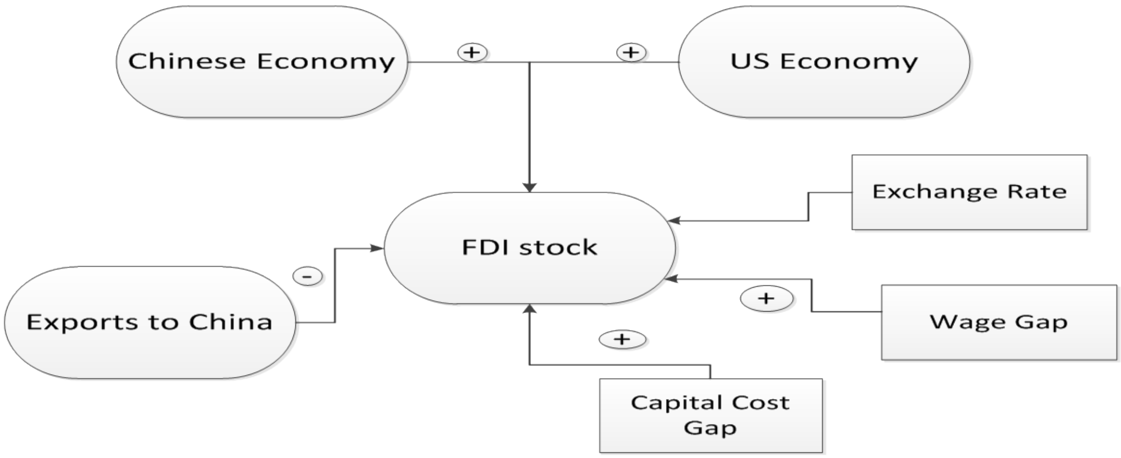

Figure 8-1 The determinants of FDI stock in China from the U.S. (Chapter 4)

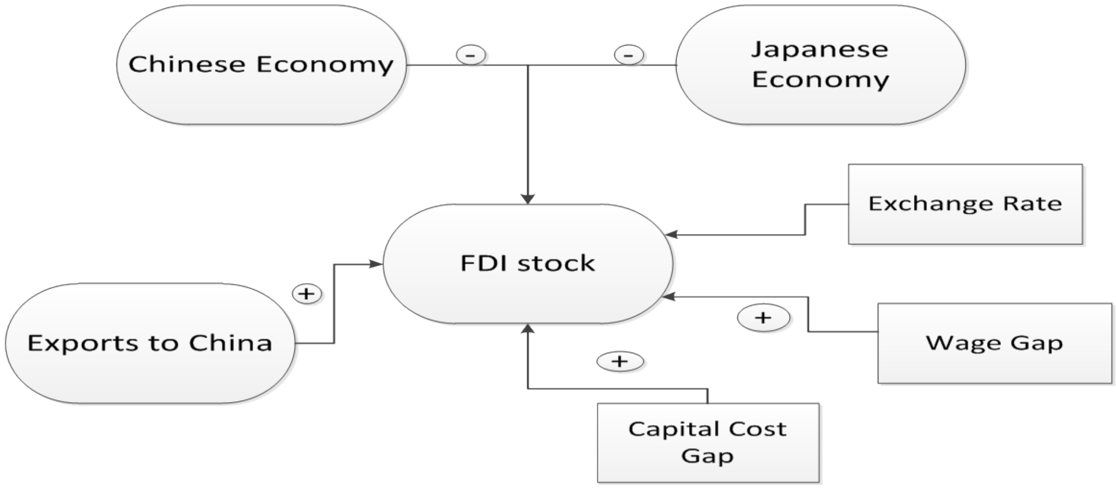

Figure 8-2 The determinants of FDI stock in China from Japan (Chapter 4)

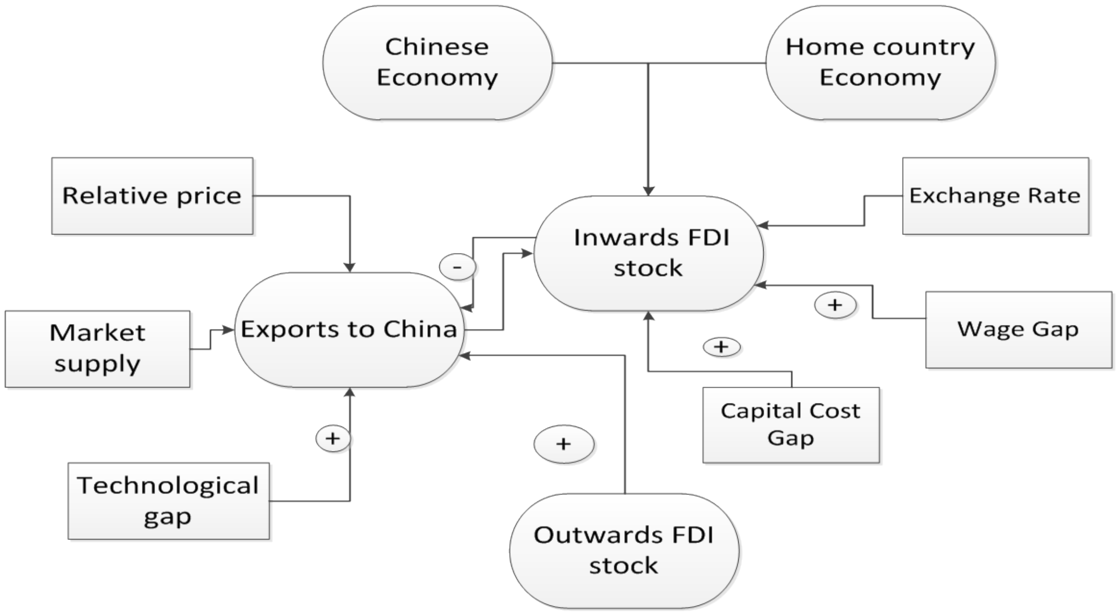

Figure 8-3 The determinants of FDI and Chinese international trade (Chapter 4 &6)

- The impact of FDI on Chinese international trade has been determined by trade costs and geographic location. The aims of Chinese exports and imports are different. This can explain the reason that main Chinese export destination markets are the U.S. and the EU, while China import are from neighbouring regions (Chapter 4&5).

  Technology capability of China has a large gap with the world. To catch the New/High technology is the most important motivation of Chinese import. FDI can replace the international trade channel to transfer the technology in particular from the regions with high trade cost. The geographical location raises the cost of firms from the U.S. and the EU. The firms are inclined to serve the Chinese market through FDI. The transfer of intangible firm asset does not limit by transportation cost. Therefore, China does not need to import the final product from these regions.

On the regional level, the geographical influence of FDI is reflected in the transportation facility and the business openness support. The main findings include:

- Trade (openness) and river resource are the important factors to attract FDI into the eastern regions rather than the hinterland. Furthermore, they are the essential factors in the competition between the eastern provinces to attract the FDI. Eastern regions highly rely on its location advantages (Chapter 6).

- The entry factors decide the investment locates in the eastern area or the western hinterland. However, the competition inside the sub-groups determined by the regional disadvantage resources. The foreign presence, technology and economic growth are the entry condition for the FDI in the eastern regions. However, inside the eastern China, the FDI seeks the cheap labour resource. On the other hand, cheap labour attracts FDI in the hinterland. However, the foreign presence, technology and economic growth decide the competition in the hinterland (Chapter 6).

- FDI has a supportive effect on the eastern China economic development, but a negative effect in the western China. Trade has an opposite effect with FDI in these two regions. The effect of FDI and trade on economic development is due to the competitive capability of regional economy and policy support.

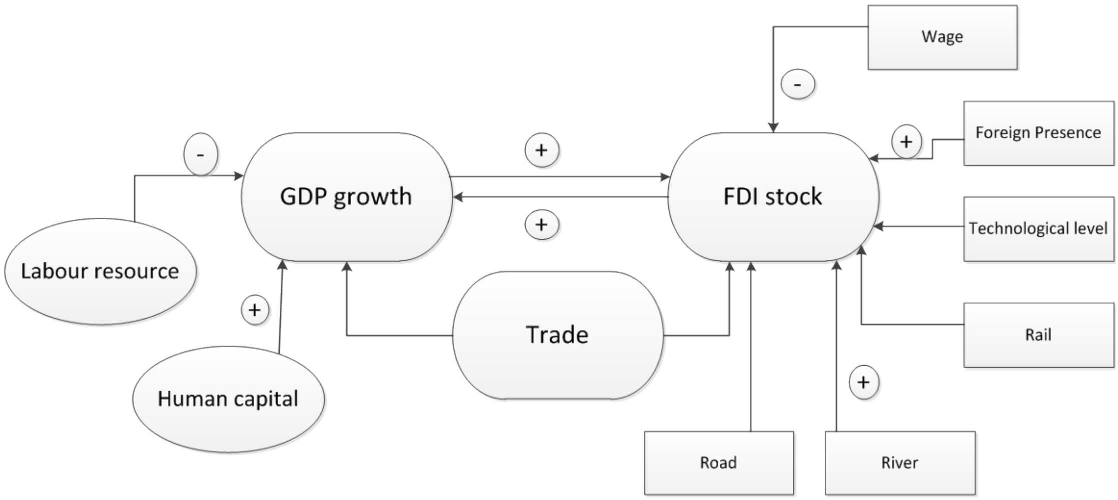

Figure 8-4 FDI distribution determinants and Chinese regional economic development

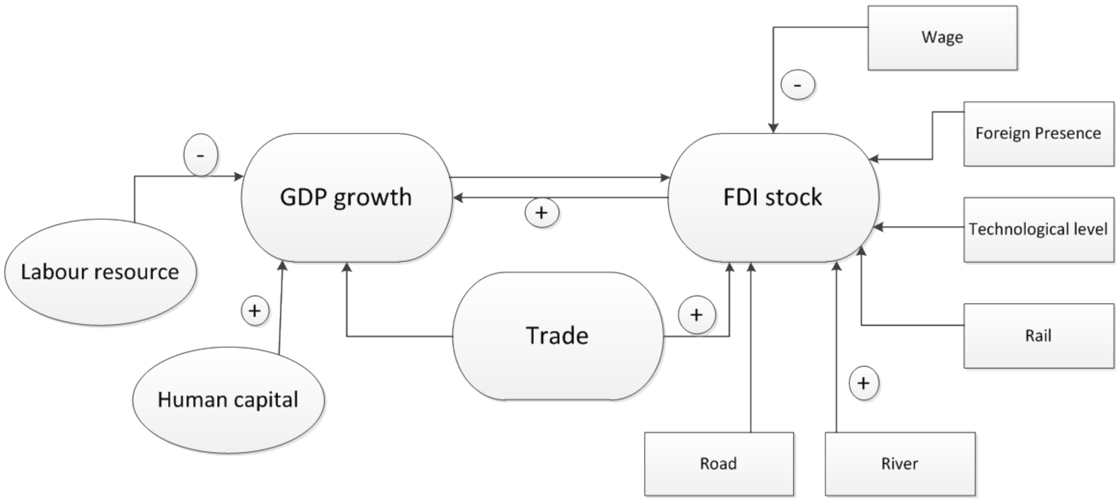

Figure 8-5 FDI distribution determinants and Chinese regional economic development in the eastern coastal area

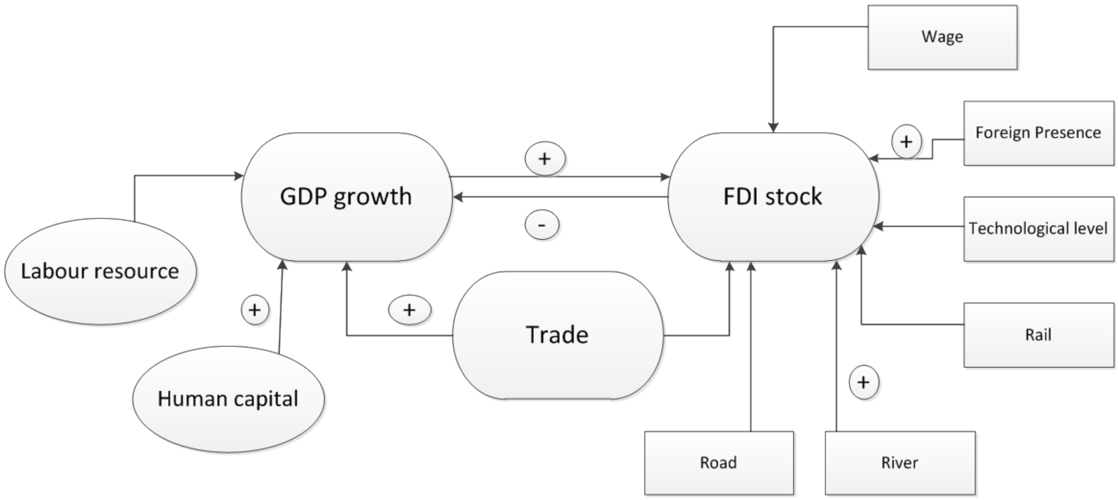

Figure 8-6 FDI distribution determinants and Chinese regional economic development

8.3 The contribution

The thesis has focus on two research question, the determinant of FDI and its impact on international trade and economy development. Most of the previous studies on the determinants of FDI in China applied the static approach, which includes the variable market effect, international trade, wage, capital cost and exchange rate. This research explores the effect of these determinants with different geographic conditions. The study undertake two level of estimation: the national level and the regional level.

At the national level, the investments from US and Japan have been use as the comparative sample. The results show that the cost gap variable (wage and capital cost) has position coefficient, which indicates the larger difference of wage between FDI resource region and China, the more FDI flows to China. These effects are similar in two data sample. However, trade and market size have different coefficients in the data sample. The market size has positive coefficient and export has negative coefficient on the FDI from US, while the coefficients are other round on the FDI in Japan. The results are quite different with previous research. Firstly, the opposite coefficients of export and market size on the FDI from these two countries are due to the geographic location. It influences the FDI motivation. Secondly, the market size has negative coefficient, which is not against the traditional theory. The negative market effect is due to the economic protection and management. There are two important points need to be noticed. Japan has “one China plus one” policy, which indicates one there is a subsidiary in China, another subsidiary has to be built at the third country. This policy not only reduce the economy reliance on China, but also can avoid the knowledge asset been controlled by its subsidiaries in China

At the regions level, the previous research focuses on regional economic development, openness, technology level, human resource. This study further explores the different in the eastern coast of China and West hinterland of China. The results indicates that coastal area has advantage of all the resource, motivate the investment clustered. Furthermore, the study further explored the competition in the sub-group. The provinces in the eastern area with lower labour cost are competitive to absorb FDI than the other province in the coastal. While the FDI in the hinterland need more support from human capital and open environment.

The impact of FDI on international trade and local economic development has been investigated. The hypothesis – that FDI drives trade has been test. However, the results show that this model is not substantiated by the data, so the maintained hypothesis that FDI is the dependent variables seems to be appropriate for China.

The third contribution is to examine the effects of FDI on economic growth. Different with the previous paper, this study has further; explore the effect in hinterland and coastal area separately. The results show that economy of the east coastal area in China is motivated by the inward FDI stock. However, the development of the hinterland in China is driven by the international trade, although the transportation resource in the hinterland is not as rich as ones in the east coast. The different effect is due to the limitation of the catch-up capability.

8.4 Limitation and further research

The limitation of the study should be acknowledged. Although the effort has been made to make thesis systemic and scientific, there are still limitations in this study.

Firstly, there is some limitation of modelling. This study explores the effect of the determinant of FDI in China with different location setting. The qualitative effects, for instance, the socio-political, culture perspective and Guanxi (business relationship or policy-business relationship), are not suitable to estimation in the regression.

Secondly, there are some limitation of data. One of the important problems of the study is that it uses the secondary dataset, which can lead to statistic bias. Furthermore, the sample size is small for the time series and panel analysis.

Thirdly, further research can be taken in the form of firm level questionnaire, interview and firm financial sheet analysis. This study can directly investigate the business and policy support environment. For instance the tax and tariff rate. As mentioned in chapter 2 that the multinational firms with new-/high-technology can be applied the tax and other benefit policy. Therefore, two group samples can be used to make comparison. One group enterprise in the special economy zone which benefit from the relevant policy, while the other group enterprises located outside the zone. The effect on the tax can be discussed. Furthermore, aggregated effect in the special economic zone can be caught though the same dataset.

Appendix

Methodology

A1.1 Introduction

This chapter reviews the important econometric methodologies which are applied in the subsequent empirical chapters. The study uses two types of datasets: the time series data and the panel data. Therefore, it requires two types of econometric analysis. The time series approach is applied to national level data in chapter 5 and 6. The panel data is applied to regional data in Chapter 7 and Chapter 8.

This chapter is arranged as follows: Section A1.2 discusses the methodologies applied to the time series data. SectionA1.3 introduces the general models for panel data estimation, which includes fixed effects (FE), random effects (RE) and generalized method of moments (GMM) approaches. Section 4.4 is the conclusion.

A1.2 Time series analysis

This section has two parts of the work. Section A1.2.1 reviews the popular tests of unit – root and the integration order of data series. Section A12.2 discusses cointegration technique and the ARDL approach.

A1.2.1 Unit root and Integration

The first step of the time series analysis involves finding the integration order of each data series. This pre-test is important for time series technique selection.

The prerequisite for time series data regression is that all the data series have to be stationary (Asteriou and Hall, 2007). The stationary process indicates that the series reverts around a constant long-term mean and has a constant variance independent of time[42]. If the mean and variance of a series change over time, the estimation results obtained by using non-stationary time series data might be spurious. This means that the relationship between the variables may not exist (Granger and Newbold, 1974).

The stationarity of a time series is usually detected by a unit root test. The purpose of a unit root test is to identify the integration order of the data series. If the results of a unit root test indicate the order of integration is 0 (denoted by $it \sim I(0)$), there is no unit root in the data series. It is stationary at level. If data series is integrated of order one (denoted by $y_t \sim I(1)$), the series contains a unit root and the series is non-stationary at level but stationary at the first difference (Δy_t). If it is integrated of order two, the series is stationary at the second difference.

The Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test are two commonly used unit root tests, which were developed from Dickey-Fuller distribution test (Dickey and Fuller, 1979). Transforming the original data series into first differences, the estimation equation of the Dickey-Fuller distribution tests are expressed as below:

Basic form:

$\Delta y_t = \theta y_{t-1} + \varepsilon_t, (\theta = \rho - 1);$ **(A1-1)**

Basic form with an intercept:

$\Delta y_t = \alpha + \theta y_{t-1} + \varepsilon_t;$ **(A1-2)**

And basic form with an intercept and a trend:

$\Delta y_t = \alpha + \theta y_{t-1} + \lambda_t + \varepsilon_t.$ **(A1-3)**

[42] Suppose the data series is in form as: $y_t = \rho y_{t-1} + \varepsilon_t$, (t= 1,2,…, n) , ε_t is a white noise process. If $\rho<1$, the series is stationary. If $\rho>1$, the series is exploring. When $\rho=1$, the series is non-stationary with a unit root.

If the t statistics for θ is smaller than the critical value, the (H_0): a unit root exists, which means $\theta = 0$. will be rejected, which indicate the series is stationary, ($\theta < 0$) [43,44]. If (H_0) cannot be rejected, the unit root test can be applied to the twice differenced series Δy_t, till the series appear to be stationary in the test results (Asteriou and Hall 2007).

As the Dickey-Fuller test received assume of independently and identically distributed errors. It is difficult to be satisfied in reality. The Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) test relax the restriction of the error term in DF test. These two tests are more frequently used. The ADF test correcting for higher order serial correlation by adding lagged differenced terms on the right hand side in order to eliminate autocorrelation. Phillips and Perron (1988) test makes a correction to the *t*-statistic of coefficient θ from an AR (1) regression to account for the serial correlation in ε_t.

A1.2.2 Cointegration Technique and the ARDL approach

A time series regression requires that all the data series are stationary (Asteriou and Hall, 2007). However, often a macroeconomic series contains a time trend with an integration order of one, which is not stationary in levels. The implying data series should not be used directly in the regression. A general approach for the data series with a unit root is to difference the data series till it becomes stationary and then use this stationary data series in the regression. The problem of this approach is that it cannot display the long-run relationships between the variables, since all the variables are in the form of differenced state.

However, if the data series with a unit root are cointegrated, it does not need to be stationary state. Cointegration refers to the situation that a linear combination of the variables exhibits a stationary process. In other words, the variables are linked with each other in the long - run. Therefore, a test for cointegration technique is commonly

[43] The *t*- statistic is altered by the presence of a constant and a constant and trend.

[44] MacKinnon (1991) tabulate appropriate critical value for each of the three above models.

applied to macroeconomic variables to determine if the time series has a long-run relationship.

There are two main tests for cointegration: two-step residual-based procedure by Engle and Granger (1987) and the system-based reduced rank regression approach by Johansen (1991, 1995). The Engle and Granger procedure is generally suitable for a single equation test of cointegration between two variables. The equation of Engle-Granger Approach is limited by two endogenous variables. But is not applicable if there exists more than one cointegration relationship when the number of cointegration relationship is unknown.

The Johansen approach is suitable in testing for integration in a multivariate equation, but it requires that all the explanatory variables are purely integrated of order one, as the variables should have the same stochastic trend if they are cointegrated. Therefore, the Johansen test is not appropriate for the data series with mixed integration order[45]. ARDL model is an alternative approach to explore the long-run relationship between the data series with mixed integration orders. Two asymptotic critical values provide a bounds test for cointegration when the independent variables are *I(0)* and *I(1)* (Pesran et al 2001). The lower value assumes the regressor are *I(0)* and the upper critical value assumes the regressor is *I(1).* If the *F*-statistic value is higher than the upper critical value, then the null hypothesis of no long-run relationship can be rejected. When the *F*-statistic value is smaller than the lower critical value, the null hypothesis cannot be rejected irrespective of the orders of integration of individual data series. In this case,

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[45] Harris (1995) argues it is possible to have a mix *of I(0), I(1),* and *I(2)* variables using the Johansen estimation approach when the multivariate model "suggested these variables should be included". As *I(0)* variables are stationary, which create cointegration relationship by itself and create linearly independent column in long-run cointegrated vector ∏. If suppose Z_t is a composition of *I(0)* and *I(1)* variables, the rank of cointegration will increase by the number of *I(0)* variables.
However, if there is a mix of *I(2)* variables with *I(1)* variables and there are more than two *I(2)* variables, the situation is more complicated. The two *I(2)* variables may be cointegrated into *I(1)* and this combination may cointegrated again *I(1)* variables into *I(0).* However, for the Johansen approach, only *I(1)* variables can be tested. In this case, *I(2)* variables have to combine to *I(1)* before the Johansen model can be applied. In this case, the Johansen estimation model may contain some degree of subject judgment.

the ARDL approach is not limited to purely *I(0)* or purely *I(1)*series, it is also suitable for mutually cointegrated. However, the limitation of this approach is that if the estimated results are between the two borders, the estimation is inclusive, which cannot be certain until there is pre-test for integration test.

The specification of the ARDL model is as below:

$$\phi(L,p)y_t = \sum_{i=1}^{k} \beta_i(L,q_i)x_{it} + \delta' w_t + u_t \qquad \textbf{(A1-4)}$$

With $\phi(L,p) = 1 - \phi_1 L - \phi_2 L^2 - ... - \phi_p L^p$ and $\beta(L,q) = 1 - \beta_{i1} L - \beta_{i2} L^2 - ... - \beta_{iq_i} L^{q_i}$

where p, q is the lag number of independent and endogenous variables variable, x is the endogenous variables, and w indicates the exogenous variables or intercept (Pesran 1997).

Compared with VAR (Vector autoregression) and VECM (Error Correction Model) by Johansen (1995, 1998), the ARDL approach is more suitable for small or finite sample data. VAR and VECM is symmetric model, which requires that all the endogenous variables have similar characterises. The number of the equation is same as the number of equation. The lag length is similar in all the equation estimation. In this case, if the lag length is too short, the model may be misspecified, however, if the lag length is too long, then the degrees of freedom erodes quickly. The ARDL approach does not require the variables with same lag order. As long as the *F*-statistic shows the existence of a long-run relationship among the variables, the lag order can be selected according to Akaike Information Criteria (AIC) or Schwarz Bayesian Criterion (SBC).

Furthermore, compared with VAR and VECM, ARDL is easier to estimate because it allows the cointegration relationship to be estimated by OLS once the lag order of the model is identified. In addition, it does not require the pre unit root tests as the model allows the variables with mixture of unit roots as long as the integration order of the variables is less than 2. However, the model collapses in the estimation with *I(2)* variables. In this case, an alternative approach has to be applied, such as the Johansen model.

There are two steps applying the ARDL model. The first step is to test whether a long-run relationship exists between the variable. The model is running using an OLS regression according to the equation as below:

$$\Delta y_t = c + \beta_0 y_{t-1} + \beta_1 x_{1,t-1} + \beta_2 x_{2,t-2} + ... + \sum_{i=1}^{p} \phi \Delta y_{t-i} + \sum_{j=1}^{q_1} \varphi \Delta x_{1,t-j} + \sum_{l=1}^{q_2} \theta \Delta x_{2,t-l} + e_t \quad \textbf{(A1-5)}$$

The F-statistic for the joint significance test whether the long-run relationship exists or not. If a cointegration relationship is proofed to exist, the long-run model can be estimated as

$$y_t = c + \sum_{i=1}^{p} \phi y_{t-i} + \sum_{j=1}^{q_1} \varphi x_{1,t-j} + \sum_{l=1}^{q_2} \theta x_{2,t-l} + e_t \quad \textbf{(A1-6)}$$

The short-run dynamic model with the error correction term is specified as

$$\Delta y_t = c + \sum_{i=1}^{p} \phi \Delta y_{t-i} + \sum_{j=1}^{q_1} \varphi \Delta x_{1,t-j} + \sum_{l=1}^{q_2} \theta \Delta x_{2,t-l} + ... + + \vartheta ecm_{t-1} + e_t \quad \textbf{(A1-7)}$$

In the chapters, the long term dynamic relationship will be explored using the ARDL model as long as the integration order of variables are less than two, ARDL model is superior for a small sample size.

A1.3 Methodology applied in panel data estimation

Two types of estimation models are used for panel data: a static model and a dynamic model. The classification of the models depends on whether it contains a lagged form of the dependent variable on the right hand side of the equation. This section reviews the main static model in section A1.3.1 and the dynamic model in section A1.3.2.

A1.3.1 The Static Models

The model for a panel with T observations for each of the N individuals is defined as Equation A1-8, which does not contain a lagged y_{it} on the right hand of the equation:

$$y_{it} = \alpha + X_{it}\beta + \varepsilon_{it}, \ \ i = 1,2,...,N; t = 1,2,...,T \qquad \textbf{(A1-9)}$$

where i subscript denotes the cross-section dimension and t denotes the time dimension. y_{it} is an NT x 1 matrix with a measure of the dependent variable in region i at time t. X_{it} is an NT x K matrix, with a measure of the explanatory variables. These variables include include region and time varying variables, time–invariant variables, and regional invariant variables. β is an 1xK vector, which represents the parameter of each variables. ε_{it} is the composite error.

The most common approach for static panel includes POOL OLS, Fixed effects and Random effects. The selection of approach has to be based on their application restriction.

A1.3.1.1 POOL OLS

POOL OLS approach doesn't control for heterogeneity. Suppose for each *t*, the composite error ε_{it} is composed of an unobserved regional effect and an idiosyncratic error.

$\varepsilon_{it} = \mu_i + e_{it}$,

The approach assumes $\mu_i \sim iid(0,\sigma^2)$, $e_{it} \sim iid(0,\sigma^2)$ and μ_i always uncorrelated with e_{it} , $E\left(\mu_i{}' e_{it}\right) = 0$. If the regional specific effect μ_i assumptions correlated regressors x_{it}, with $E\left(x_{it}{}' e_{it}\right) \neq 0$ t=1,2,…,T., the restriction of POOL OLS model is violated. The estimation is inconsistent.

The Fixed Effects (FE) and Random Effects (RE) models allow for the existence of heterogeneity in the panel data but restrict the effect in different ways. The fixed effect approach assumes at regional heterogeneity is correlated with the regressors and treats each regional effect μ_i as a parameter. However, it may lead to a loss in degree of freedom. The Random effect model uses the assumption that regional heterogeneity is uncorrelated with the repressors.

A1.3.1.2 Fixed Effect

The FE approach eliminates the unobserved effects μ_i through applying the 'within' transformation. The main principle of the fixed effect model is to remove the time average value of each region on both sides of the equation. This gives the transformed equation in terms of deviations from the mean is that:

$$y_{it} - \bar{y}_i = \beta(x_{it} - \bar{x}_i) + (e_{it} - \bar{e}_i) \quad \textbf{(A1-10)}$$

where y_{it} is the average value, $\bar{y}_i$ is the average value of y_{it} as $\bar{y}_i = \frac{1}{T}\sum_{t=1}^{T} y_{it}$,

$\bar{x}_i = \frac{1}{T}\sum_{t=1}^{T} x_{it}$ and $\bar{e}_i = \frac{1}{T}\sum_{t=1}^{T} e_{it}$

Through the transformation, the time invariant variables μ_i has been removed. FE approach applies OLS estimation to equation 4-10 to generate the within group estimation results.

Although the fixed effect effects approach allows for heteroskedasticity in the data, it has the strict assumption that the slope coefficients are identical for all regions, but that the can varies across regions. x_{it} is the disturbance error termisturbance error term e_{it}. The disturbance errors are conditionally homoskedastic and not serially correlated.

Thus: E(e_{it})=0 and $E(e_{it}{}' e_{js}) = \begin{cases} \sigma_e^2 & i = j, t = s \\ 0 & otherwise \end{cases}$

A1.3.1.3 Random effects

Same as fixed effect, the random effect approach allows for heteroskedasticity and a certain degree of correlation between the observations estimated the coefficient in general least square approach. However, it has a strict restriction on that regional effect does not correlate with the explanatory variables.

In general, the random effects are more efficient than the fixed effects model. Compared with the fixed effect models, the RE approach does not need to introduce extra regional effects as a parameter in the model. The increase in the number of parameters reduces the degrees of freedom, especially in panel data with large N.

However, to ensure the consistent results, the random effects model has the strict assumption of orthogonality between μ_i and x_{it} . Fixed effect does not have this restriction, as it has removed the time-invariant effects through difference transformation.

Diagnostic test: F-statistics OLS vs Fixed effect

Diagnostic tests are important to test the validity of the models. The Standard *F*- test is used to compare the efficiency between the fixed effects model and with the simple common constant OLS method.

The F-test statistics is calculated as follows:

$$F = \frac{(R_{FE}^2 - R_{CC}^2)/(N-1)}{(1-R_{FE}^2)/(NT-N-k)} \sim F(N-1, NT-N-k) \qquad \textbf{(A4-11)}$$

where R_{FE}^2 is the coefficient of determination of the fixed effect model, R_{CC}^2 is the coefficient of determination of the common constant model. The null hypothesis for this test is that the regional effect error term is constant $H_0 : \mu_1 = \mu_2 = ... = \mu_n$. If F statistic value is larger than the critical value for a specific confidence level, the F-test is significant, the null hypothesis is rejected, thus, fixed effect is appropriate in regression rather than POOL OLS. If the null hypothesis cannot be rejected, OLS is appropriate.

Diagnostic test Hausman test: Fixed effect vs Random Effect

The Random effects model is, in general, the more efficient model than the fixed effects model, because fixed effects involve regional constants μ_i, which use up large degrees of freedom especially if the data set has large N. The decrease of the degrees of freedom reduces the efficiency of the fixed effects model. The random effects model does not use up large degrees of freedom in the estimation. Thus, random effect is superior to fixed effects.

However, the results of random effects may be inconsistent. The model assumes that the individual error terms are uncorrelated with the explanatory variables. If the assumption is violated, the results are biased.

The Hausman test is widely used to test whether the RE model is consistent. The null hypothesis H_0 is: no correlation, the coefficients of both OLS-FE (β_0) and GLS-RE (β_1) are consistent but β_0 is less efficient. The alternative hypothesis is that β_0 is consistent while β_1 is inconsistent. The statistical model of *F*-test statistic is as follows:

$$H = (\beta_1 - \beta_2)'\left(Var(\beta_1) - Var(\beta_1)\right)^{+}(\beta_1 - \beta_2)$$

If the χ^2 statistic of the Hausman test is significant, the null hypotheses that the RE model is consistent, will be rejected. This indicates that at least one of the coefficients is inconsistent. In this case, the estimation results of the FE approach are considered superior to the random effects model.

A1.3.2 Dynamic panel data models

Different from the static model, there is an extra item on the right side of the equation 4-11, $\gamma y_{i,t-1}$,where $y_{i,t-1}$ is the lagged variable of regional dependent variables. γ is the coefficient.

The prototypical dynamic panel data model as below:

$$y_{i,t} = \alpha + \gamma y_{i,t-1} + \beta' X + \varepsilon_{it} \qquad |\alpha| \prec 1 \quad \textbf{(3)} \qquad \textbf{(A1-12)}$$

where $\varepsilon_{it} = \mu_i + e_{it}$

The i subscript denotes the cross-section dimension and t denotes the time dimension. y_{it} is an NT x 1 matrix with a measure of the dependent variables in region i at time t. X_{it} is an NT x K matrix, with a measure of the explanatory variables. β is an 1xK vector, which represents the parameter of each variable, ε_{it} is the composite error, which is the sum of an unobserved regional effect and an idiosyncratic error. μ_i is assumed to be uncorrelated with e_{it}. In other words, $Cov(\mu_i e_{it}) = 0$, while μ_i is independent and identically distributed $\mu_i \sim IID(0, \sigma^2), e_{it} \sim IID(0, \sigma^2)$

The problem of Pool, FE and RE approach in dynamic model

Because y_{it} is a function of regional effect μ_i, $y_{i,t-1}$ is likely correlated with μ_i. As in the right side of the equation 4-12, $y_{i,t-1}$ is treated as a regressor. The regressor is correlated with the error term. The assumption of OLS approach does not allow heterogeneity between the series, otherwise the results are biased.

The validity of the fixed effects approach in a dynamic setting is violated. The time – invariant effect of μ_i has been removed though the within transformation.

This gives the transformed equation in terms of deviations from the time means:

$$y_{it} - \bar{y}_i = \alpha + \gamma(y_{i,t-1} - \bar{y}_{i.-1}) + \beta(x_{it} - \bar{x}_i)\beta + (e_{it} - \bar{e}_i) \quad \textbf{(A1-13)}$$

with $\bar{y}_i = \frac{1}{T}\sum_{t=1}^{T} y_{it}$, $\bar{y}_{i,-1} = \frac{1}{T}\sum_{t=1}^{T} y_{i,t-1}$ $\bar{x}_i = \frac{1}{T}\sum_{t=1}^{T} x_{it}$ and $\bar{e}_i = \frac{1}{T}\sum_{t=1}^{T} e_{it}$

Although FE approach removed the unobserved effects μ_i by applying the 'within' transformation, the results may be still biased. Since y_{it} is a function of the error term e_{it} , it correlates with the average value of the error term $\bar{e}_i$. The lagged form $y_{i,t-1}$ is correlated with $\bar{e}_i$. The difference between $y_{i,t-1}$ and the average y_i ,which in the form of ($y_{i,t-1}$- $\bar{y}_{i,-1}$) in the right side of the equation, is correlated with the difference between e_{it} and the average e_{it} , $(e_{it} - \bar{e}_i)$. The Random GLS (Generalized least squares) is also challenged due to the quasi-demean regressors (y_{it-1}- $\theta\bar{y}_{i,-1}$) which may be correlated with ($\mu_{i,t-1}$- $\theta\bar{\mu}_{i,-1}$) for the same reason (Baltagi, 2001).

GMM (generalized method of moments) models are widely used in dynamic panel data estimation. This model instruments the endogenous variable with lagged variables to meet the moment condition. This section reviews three important GMM estimators.

A1.3.2.1 Anderson and Hsian (1981) IV approach estimator

Anderson and Hsian (1981) suggested a 2SLS (2 stage least squares) estimator based on the first difference estimation equation. The model transforms the equation through first differences as shown below:

$$\Delta y_{it} = \alpha + \gamma\Delta y_{i,t-1} + \beta\Delta x_{it} + (e_{it} - e_{i,t-1}) \quad \textbf{(A1-14)}$$

where Δ is the first difference. Δy_{it} is the first difference of dependent variables in the region i at time t. Δx_{it} is the first difference of independent variables. μ_i is the time invariant variable.

After being transformed, the regional effect μ_i is moved through the first difference. $\Delta y_{i,t-1}$ or $y_{i,t-1}$ is uncorrelated with Δe_{it} but is highly correlated with Δy_{it}, if e_{it} is not serially correlated (Baltagi,2001).

The approach instrumented regressing $\Delta y_{i,t-1}$ on the right side of equation with additional differenced lags and level lags: $\Delta y_{i,t-1}$,and $y_{i,t-1}$, which are unrelated with new error term $\Delta e_{it.}$ Thus serial correlation does not exist in the new model.

The main weakness of an IV approach in a dynamic panel is that the instrument choice involves a tradeoff between the lag distance and the depth of sample (Roodman 2008). If y_{it-2} is used as the instrument, the observation in period 2 will be removed from the estimation sample as the instrument. Thus, the sample depth is reduced.

Arellano and Bond’s (1991) difference GMM and Blundell and Bond’s (2002) system GMM estimator are more efficient than Anderson and Hsian’s (1981) GMM estimator. These models avoid the sample lag and depth take off as they utilize the orthogonality conditions and leave the missing observation lag as 0 through applying a standard instrument set. These models are discussed below:

A1.3.2.2 Arellano and Bond Difference GMM estimator

Arellano and Bond (1991) extend the instrument matrix in the estimation in a difference equation as below:

$$y_{i3} - y_{i2} = \alpha + \gamma(y_{i2} - y_{i1}) + (\mu_i - \mu_i) + (e_{i3} - e_{i2}) \qquad \textbf{(A1-15)}$$

that y_{i1} is the instrument for Δy_{i3} , as it is highly related with the $(y_{i2} - y_{i1})$ but uncorrelated with the error term $(e_{i3} - e_{i2})$. y_{i1} could be the instrument for Δy_{i3} in the third period, the other periods it is zero (Roodman, 2008).

Same as above, $y_{i4} - y_{i3} = \alpha + \gamma(y_{i3} - y_{i2}) + (\mu_i - \mu_i) + (e_{i4} - e_{i3})$, y_{i2} and y_{i1} could be the instruments for Δy_{i4}.

Thus, Δy_{it} (for t≥3) can be (t-2) level instrument [$y_{i1},..., y_{i,t-2}$]. The sparse instrument (T-2)(T-2) matrix of the form is as below:

$$Z_i = \begin{bmatrix} [y_{i1}] & & & 0 \\ & [y_{i1,} y_{i2}] & & \\ & & \ddots & \\ 0 & & & [y_{i1,...,} y_{i,T-2}] \end{bmatrix} \quad \textbf{(A1-16)}$$

corresponding to the first differenced equations for *t≥3* with the moment condition $E(y_{it}\Delta e_{is}) = 0$, for instance, Δy_{i3} is instrument with, y_{i1}, the other is missing out.

The matrix for all the instruments is $Z = \left[Z_1^{'},..., Z_N^{'}\right]$, corresponding to the family of (T-2)(T-1)/2 moment conditions: $E(y_{it}\Delta e_{is}) = 0$

Furthermore, the model may include the exogenous variables x_{it}. If x_{it} are exogenous with $E(x_{it}e_{is}) = 0$ for s<t, and zero otherwise, then only $\left[x'_{i1,} x'_{i2,} ..., x'_{i,(s-1)}\right]$ are valid instruments for the difference equation at time period s.

The first difference equation is

$$y_{i3} - y_{i2} = \alpha + \gamma(y_{i2} - y_{i1}) + \beta(x_{ie} - x_{i2}) + (\mu_i - \mu_i) + (e_{i3} - e_{i2}) \quad \textbf{(A1-17)}$$

The analogous instrument group is

$$Z_i = \begin{bmatrix} [y_{i1,} x'_{i1,} x'_{i2,} x'_{i3}] & & & 0 \\ & [y_{i1,} y_{i2,} x'_{i1,} x'_{i2,} x'_{i3,} x'_{i4}] & & \\ & & \ddots & \\ 0 & & & [y_{i1,...,} y_{i,T-2,} x'_{i1,...,} x'_{i,T-2}] \end{bmatrix} \quad \textbf{(A1-18)}$$

corresponding to the first difference equations for $t \geq 3$, with the moment condition $E(y_{it}\Delta e_{is}) = 0$ and $E(x_{it}e_{is}) = 0$, where x_{it} are strictly exogenous regressor with ts≥1.

A1.3.2.3 Blundell and Bond System GMM estimator

Blundell and Bond (1998) question the use of the first difference GMM estimator for the panels with a finite data sample. With a small number of time series observations, the first-difference GMM estimator is poorly behaved because the lagged levels of the variables are only weak instruments for subsequent first-difference.

Blundell and Bond (1998) develop system GMM, which extends Arellano and Bond model (1995), for small sample panel data. The system GMM includes two sets of data, one is in level, and the other is in the difference. Arrellano and Bond (1991) used the lagged level of y_{it} to instrument the differenced y_{it}. Blundell and Bond (1998) add another group of instruments which use the lagged difference y_{it} to instrument level y_{it}.

If y follows a random walk, past level data convey little information about future change. Therefore, the past changes of y_t, Δy_{it-1}, are uncorrelated with the current term in level y_{it}, (Blundell and Bond 1998) which can be used as instruments for the estimations. In this case, the instruments for the difference equation (same instruments matrix in Arrellano and Bond Difference GMM estimator Z_i) are assumed to be zero for the level equation and the new instrument for the level equation is zero for the difference data. As only one lag difference is used for each period as instrumenting variables, the instrument set for level y_{it} as

$$Z_i^y = \begin{bmatrix} 0 & 0 & 0 & 0 & 0 \\ & \Delta y_{i2} & & & \\ & & \Delta y_{i3} & & \\ & & & & \\ 0 & & & & \Delta y_{i,T-1} \end{bmatrix}$$

Corresponding to the level equations for *t≥2* with the moment condition: $E(\Delta y_{it} e_{is}) = 0$. The instrument matrix for the system (with difference equation and level equation) can be written as

$$Z_i^+ = \begin{bmatrix} Z_i & & & 0 \\ & \Delta y_{i2} & & \\ & & \Delta y_{i3} & \\ & & & \\ 0 & & & \Delta y_{i,T-1} \end{bmatrix}$$

Corresponding to the system consisting of (T-2) equations in the first differences and the (T-2) equations in level for t ≥ 3, where Z_i is an instrument set for the first difference.

$$Z_i^+ = \begin{bmatrix} [y_{i1}] & & 0 \\ & [y_{i1}, y_{i2}] & \\ & & \\ 0 & & [y_{i1}, \ldots, y_{i,T-2}] \end{bmatrix}$$

Two issues are of concern regarding for the validity of the assumptions on which the GMM approach is based. The first issue is the overriding of the instrument variables.

Table A1-1 summary of the Econometrics methodologies for panel estimation

	Assumption			Diagnostic Tests for validity of assumption
	VAR(η_i)=0	E($x_{i,t}$, η_i)=0	E($x_{i,t}$ μ_{it})=0	
POOL OLS	Yes	Yes	Yes	F test:
FE	No	Yes	Yes	Hausman test
RE	No	No	Yes	LM test
difference GMM	No	No	No	Sargen test
System GMM	System GMM is superior in case of small sample with small time period			Hansen test AR(2)

The Sargan/Hansen test of over-identifying restrictions tests the validity of the instruments. Another issue has of concern in the estimation is serial correlation of the error term. The second-order serial correlation of the error term is widely used to relieve the problem

According to Wooldridge (2002), the different methods discussed above and their application requirements and tests are summarised in Table A1-1.

A1.4 Conclusion

The econometric models in the chapter are applied to the time series and panel data estimation in the thesis. The ARDL model is more suitable for the dataset with the mixed integration order in the time series cointegraion analysis. Both first difference GMM and system GMM approaches are suitable for panel estimations.

Additional Tables

Table A4-1 estimation result for the determinants of Inward FDI stock in China

	with total GNP	*with Chinese GNP*	*with world GNP*
dLNGNP(-1))	-0.658141 (-0.825508)	0.627607 (1.502208)	-0.788538 (-1.065397)
dLNEXPORT(-1))	0.196907 (1.209888)	0.135535 (0.937206)	0.211802 (1.314812)
dEX(-1)	0.002588 (1.709713)	0.001751 (1.141499)	0.002524 (1.691654)
dLNWAGE(-2)	1.605681*** (4.216722)	2.491446*** (3.378187)	1.742246*** (4.164672)
dCCOST(-1)	0.000301 (0.172723)	0.000221 (0.132467)	0.000166 (0.095994)
C	0.119984*** (3.677944)	0.070501*** (2.288041)	0.122039*** (4.018807)
R-squared	0.507462	0.545762	0.519138
Adjusted R-squared	0.370646	0.419585	0.385565
S.E. of regression	0.085239	0.081858	0.084222
Sum squared resid	0.130782	0.120612	0.127681
Log likelihood	28.49284	29.46424	28.78073
F-statistic	3.709085	4.325365	3.886558
Prob(F-statistic)	0.017521	0.009248	0.014517
Mean dependent var	0.128406	0.128406	0.128406
S.D. dependent var	0.107446	0.107446	0.107446
Akaike info criterion	-1.874403	-1.955353	-1.898394
Schwarz criterion	-1.579890	-1.660840	-1.603881
Hannan-Quinn criter.	-1.796269	-1.877219	-1.820260
Durbin-Watson stat	2.150371	1.899058	2.185867
Serial Correlation (2)	0.38	0.02	0.56
Heteroskedasticity	0.25	0.59	0.26
RamseyRESET	0.00	1.62	0.02

*** significant at the 1%, ** significant at 5%, * significant at 10% and rejection of the null hypothesis of non-stationary

Table A4-2 Estimation result for the determinants of Inward FDI stock in China from United States

	with GNP	*with GNPcn*	*with GNPus*
dLNGNP(-1)	1.219096	0.096662	1.267759
	(0.962192)	(0.185452)	(1.044559)
dLNEXPORT(-1)	-0.304061	-0.347758***	-0.296831
	(-1.554687)	(-1.771936)	(-1.518537)
dEX(-1)	0.003134	0.003718	0.003129
	(1.414637)	(1.597346)	(1.430962)
dLNWAGE(-2)	0.291486	0.621515	0.237782
	(1.423049)	(0.600597)	(1.306713)
dCCOST(-1)	0.002671	0.003496	0.002598
	(0.998720)	(1.342157)	(0.975926)
C	0.109284***	0.146539***	0.108677**
	(2.244141)	(4.281253)	(2.358264)
R-squared	0.423200	0.391133	0.428778
Adjusted R-squared	0.242950	0.200862	0.250271
S.E. of regression	0.078950	0.081115	0.078567
Sum squared resid	0.099729	0.105273	0.098765
Log likelihood	28.14310	27.54796	28.25000
F-statistic	2.347849	2.055664	2.402027
Prob(F-statistic)	0.088564	0.124888	0.083177
Mean dependent var	0.129019	0.129019	0.129019
S.D. dependent var	0.090738	0.090738	0.090738
Akaike info criterion	-2.013009	-1.958905	-2.022728
Schwarz criterion	-1.715452	-1.661348	-1.725171
Hannan-Quinn criter.	-1.942914	-1.888810	-1.952632
Durbin-Watson stat	0.534185	0.443287	0.561198

*** significant at the 1%, ** significant at 5%, * significant at 10%

Table A4-3 estimation result for the determinants of Inward FDI stock in China from United States

	with GNP	*with GNPcn*	**with GNPus**
d LNGNP(-1)	-0.148245	0.272098	-0.253897
	(-0.175616)	0.949309	(-0.309628)
dLNEXPORT(-1)	-0.187155	-0.198597*	-0.184608
	(-1.698881)	-1.879808	(-1.699570)
dEX(-1)	0.002584**	0.002368**	0.002577**
	(2.541493)	2.358411	(2.557693)
dLNWAGE(-2)	0.145335	0.904348	0.143425
	(0.963245)	1.456111	(1.092577)
dCCOST(-1)	0.002226**	0.002380*	0.002235*
	(1.785747)	1.952344	(1.804549)
C	0.112547	0.099271	0.107926
	(0.920720)	0.801411	(0.764387)
AR(1)	0.888313***	0.892054***	0.899116***
	(5.292098)	5.181855	(5.346167)
R-squared	0.777744	0.791428	0.778664
Adjusted R-squared	0.682492	0.702040	0.683806
S.E. of regression	0.051607	0.049993	0.051500
Sum squared resid	0.037286	0.034990	0.037131
Log likelihood	36.70583	37.37304	36.74936
F-statistic	8.165092	8.853856	8.208713
Prob(F-statistic)	0.000626	0.000413	0.000610
Mean dependent var	0.125683	0.125683	0.125683
S.D. dependent var	0.091586	0.091586	0.091586
Akaike info criterion	-2.829126	-2.892670	-2.833273
Schwarz criterion	-2.480952	-2.544496	-2.485099
Hannan-Quinn criter.	-2.753564	-2.817108	-2.757710
Durbin-Watson stat	1.722194	1.716166	1.705598
Serial Correlation (2)	1.49	1.20	1.50
Heteroskedasticity	0.88	0.78	0.89
Ramsey RESET	0.01	0.01	0.01

*** significant at the 1%, ** significant at 5%, * significant at 10%

Table A4-4 Estimation result for the determinants of Inward FDI stock in China from Japan with autoregression

	With total GNP	*with GNPcn*	*with GNPjp*
dLNGNP(-1)	-0.292138	-0.093028	-0.218884
	(-1.147336)	(-0.383041)	(-0.951863)
dLNEXPORT(-1)	0.000155	-0.041762	-0.011053
	(0.001638)	(-0.462223)	(-0.117190)
dEX(-1)	0.000563	0.001442	0.000598
	(0.470415)	(1.147666)	(0.480065)
dLNWAGE(-2)	0.861056***	0.575726*	0.849322
	(2.993309)	(1.881102)	(2.775295)
dCCOST(-1)	-0.000227	0.000974	-0.000151
	(-0.173296)	(0.903633)	(-0.108493)
C	0.143916	0.138622***	0.141389***
	(7.980882)	(6.704354)	(7.940195)
R-squared	0.486471	0.449271	0.474007
Adjusted R-squared	0.325993	0.277169	0.309634
S.E. of regression	0.069649	0.072128	0.070490
Sum squared resid	0.077617	0.083239	0.079501
Log likelihood	30.90051	30.13122	30.63671
F-statistic	3.031393	2.610485	2.883732
Prob(F-statistic)	0.041109	0.065532	0.048303
Mean dependent var	0.139660	0.139660	0.139660
S.D. dependent var	0.084837	0.084837	0.084837
Akaike info criterion	-2.263683	-2.193747	-2.239701
Schwarz criterion	-1.966126	-1.896190	-1.942144
Hannan-Quinn criter.	-2.193587	-2.123652	-2.169606
Durbin-Watson stat	1.292809	1.272049	1.216769

*** significant at the 1%, ** significant at 5%, * significant at 10%

Table A4-5 Estimation result for the determinants of Inward FDI stock in China from Japan

	with total GNP	*with GNP cn*	*with GNP jp*
dLNGNP(-1)	-0.171507	0.202884	-0.158821
	(-0.574149)	(1.009185)	(-0.551128)
dLNEXPORT(-1)	-0.039443	-0.072742	-0.038666
	(-0.348256)	(-0.775599)	(-0.333358)
dEX(-1)	0.000782	0.000580	0.000748
	(0.738714)	(0.607682)	(0.682987)
dLNWAGE(-2)	0.689791*	0.754352*	0.693039*
	(2.143893)	(2.117358)	(2.098051)
dCCOST(-1)	0.000251	0.000466	0.000230
	(0.201482)	(0.490689)	(0.178978)
C	0.138145***	0.117801***	0.136613***
	(4.965247)	(3.032043)	(4.837544)
AR(1)	0.405158	0.571957	0.424924
	(1.508795)	(2.269218)	(1.586616)
R-squared	0.542186	0.557146	0.542015
Adjusted R-squared	0.345979	0.367352	0.345736
S.E. of regression	0.069791	0.068641	0.069804
Sum squared resid	0.068190	0.065962	0.068215
Log likelihood	30.36707	30.71593	30.36316
F-statistic	2.763347	2.935527	2.761449
Prob(F-statistic)	0.054910	0.045404	0.055026
Mean dependent var	0.137479	0.137479	0.137479
S.D. dependent var	0.086298	0.086298	0.086298
Akaike info criterion	-2.225435	-2.258660	-2.225063
Schwarz criterion	-1.877261	-1.910486	-1.876889
Hannan-Quinn criter.	-2.149873	-2.183097	-2.149500
Durbin-Watson stat	2.138928	2.153858	2.151711
Serial Correlation (2)	1.07	0.86	1.10
Heteroskedasticity	0.79	0.98	0.85
Ramsey RESET	5.92	0.54	1.37

*** significant at the 1%, ** significant at 5%, * significant at 10%

Table A4-6 The *F*-statistic results of ARDL-OLS estimation

	LNGNPC			*LNGNPW*		
P	*NONE*	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*
1	2.1117	1.6491	***5.1024***	***4.3942***	2.8692	6.9822
	[.127]	[.223]	***[.012]***	***[.012]***	[.057]	[.004]
2	4.7680	1.7634	1.6760	5.1957	1.6919	12.8650
	[.039]	[.275]	[.321]	[.033]	[.290]	[.014]

P indicates the maximum lag order. [.] indicates the p-value of the F-statistic results

Table A4-7 The ARDL lag order selection

		LNGNPC			*LNGNPW*		
P		*NONE*	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*
1	AIC	n.a.	n.a.	***(1,0,1,0,1,0)***	***(1,0,0,0,0,0)***	(1,0,0,0,0,0)	(1,1,1,0,0,1)
	SBC	n.a.	n.a.	***(1,0,0,0,0,0)***	***(1,0,0,0,0,0)***	(1,0,0,0,0,0)	(1,1,1,0,0,1)
2	AIC	(2,2,0,2,1,2)	n.a.	n.a.	(2,2,2,1,2,2)	n.a.	(2,0,2,1,2,2)
	SBC	(2,2,0,2,1,2)	n.a.	n.a.	(2,2,2,1,2,2)	n.a.	(2,0,2,1,2,2)

P indicates the maximum lag order. (.) indicates the selected lag order

Table A4-8 The *F*-statistic results of ARDL-OLS estimation

p	*GNP*			*GNPC*			*GNPUS*		
	NONE	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*
1	19.9339	***15.2774***	13.7369	13.0350	***19.7550***	17.7268	13.5197	***12.0410***	10.6371
	[.000]	*[.000]*	[.000]	[.000]	*[.000]*	[.000]	[.000]	*[.001]*	[.002]
2	8.3085	9.0247	9.8518	1.1921	.86987	.69348	9.8514	13.7567	16.0152
	[.030]	[.049]	[.095]	[.452]	[.597]	[.692]	[.022]	[.028]	[.060]

P indicates the maximum lag order; [.] indicates the p-value of the F-statistic results

Table A4-9 The lag order selection of the ARDL approach

p		*GNP*			*GNPC*			*GNPUS*		
		NONE	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*
1	AIC	(1,1,0,1,0,1)	(1,0,1,1,0,0)	(1,*1,1,1*,0,0)	(1,1,0,1,0,0)	(1,1,1,1,1,0)	(1,1,1,1,0,0)	(1,1,0,1,0,1)	(1,0,1,1,0,0)	(1,1,1,1,0,0)
	SBC	(1,1,0,1,0,1)	**(1,0,0,1,0,0)**	(1,1,1,1,0,0)	(1,1,0,1,0,0)	**(1,0,0,1,0,0)**	(1,1,1,1,0,0)	(1,1,0,1,0,1)	**(1,0,0,1,0,0)**	(1,1,1,1,0,0)
2	AIC	(2,2,2,2,2,2)	(2,2,2,2,2,2)	(2,1,0,2,2,2)	n.a.	n.a.	n.a.	(2,2,2,2,2,2)	(2,2,2,2,2,2)	(2,1,0,2,2,2)
	SBC	(2,1,2,1,2,2)	(2,0,0,1,2,2)	(2,1,0,1,2,2)	n.a.	n.a.	n.a.	(2,1,2,1,2,2)	(2,0,0,1,2,2)	(2,1,0,1,2,2)

P indicates the maximum lag order

Table A4-10 The *F*-statistic results of ARDL-OLS estimation

	GNP			*GNPC*			*GNPJP*		
P	*NONE*	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*
1	3.0272	***5.4490***	3.5580	3.8230	4.6734	***6.3693***	***3.0552***	5.0678	3.3382
	[.059]	*[.010]*	[.051]	[.030]	[.020]	*[.010]*	*[.058]*	[.015]	[.059]
2	.87224	15.8749	8.6514	2.6361	8.2291	3.7291	.57791	9.9379	7.2258
	[.581]	[.022]	[.107]	[.184]	[.056]	[.227]	[.739]	[.043]	[.127]

P indicates the maximum lag order. [.] indicates the p-value of the *F*-statistic results

Table A4-11 The ARDL lag order selection

		GNP			*GNPC*			*GNPJP*		
P		*NONE*	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*	*NONE*	*INPT*	*INPT +T*
1	AIC	(1,1,0,1,0,1)	(1,0,0,1,0,1)	(1,0,0,1,0,1)	(1,0,0,1,1,1)	(1,0,0,1,0,1)	(1,1,0,1,0,1)	(1,0,0,1,0,1)	(1,0,0,1,0,1)	(1,0,0,1,0,1)
	SBC	(1,0,0,1,0,1)	***(1,0,0,1,0,1)***	(1,0,0,1,0,1)	(1,0,0,1,0,1)	(1,0,0,1,0,1)	***(1,0,0,0,0,1)***	***(1,0,0,1,0,1)***	(1,0,0,1,0,1)	(1,0,0,1,0,1)
2	AIC	n.a.	(2,2,1,1,1,0)	n.a.	n.a.	(1,0,0,0,2,0)	n.a.	n.a.	(2,1,1,1,1,1)	n.a.
	SBC	n.a.	(2,2,1,1,0,0)	n.a.	n.a.	(1,0,0,0,2,0)	n.a.	n.a.	(2,1,1,0,1,1)	n.a.

P indicates the maximum lag order

Table A5-1 OLS FE RE estimation for FDI stock in overall China without robust

Variables	POOL		Fixed effect		Random effect	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
FDI (-1)	.9158278***	54.16	.6194802***	14.18	.9130432***	51.16
Growth(-1)	.0023061***	7.66	.0013084***	4.50	.0022985***	7.68
Trade(-1)	-.0066654	-0.33	-.1562145***	-4.86	-.0133853	-0.62
Wage (-1)	-.0142087***	-4.83	.0046659	1.15	-.0141537***	-4.76
FP(-1)	.0821366***	4.29	.0607727**	2.32	.0867485***	4.37
Tech(-1)	.0084756	0.80	.0201953	1.31	.0081264	0.73
Rail(-1)	.0459256	0.46	-.5943118	-1.32	.0493506	0.45
River(-1)	.0200084***	1.45	-.0718728	-0.39	.0215138	1.44
Road(-1)	.003594	0.44	.0120488	1.01	.0044744	0.52
C	.0693408***	4.75	.3819469***	9.69	.073331***	4.80
Number of obs	284		284		284	
F	1234.44		36.41			
Prob > F	0.0000		0.0000			
Wald χ^2					9260.43	
Prob > χ^2					0.0000	
corr(η_i, Xb)			0.8414			
R-squared	0.9759					
Adj R-squared	0.9751					
R-sq within			0.5682		0.5176	
R-sq between			0.9457		0.9974	
R-sq overall			0.9195		0.9759	
sigma_u			.04197302		.00174571	
sigma_e			.01196973		.01196973	
rho			.92479065		.02082735	
F test that all η_i =0			4.68			
Prob > F			0.0000			
Hausman test χ^2			92.98			
Prob> χ^2			0.0000			
Likelihood-ratio test LR χ^2			536.49			
Prob > χ^2			0.0000			

Notes:*, **, *** denote significance at the 90, 95 and 99 % confidence level.

Table A5-2 OLS FE RE estimation for FDI stock in overall China with robust

variables	POOL		Fixed effect		Random effect	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
FDI (-1)	.9158278***	42.12	.6194802***	7.40	.9130432***	39.06
Growth(-1)	.0023061	1.61	.0013084*	1.66	.0022985	1.63
Trade(-1)	-.0066654	-0.32	-.1562145*	-1.91	-.0133853	-0.56
Wage (-1)	-.0142087***	-5.21	.0046659	0.54	-.0141537***	-4.99
FP(-1)	.0821366***	3.68	.0607727**	2.26	.0867485***	3.65
Tech(-1)	.0084756	0.87	.0201953 **	2.24	.0081264	0.80
Rail(-1)	.0459256	0.81	-.5943118*	-1.92	.0493506	0.79
River(-1)	.0200084***	3.59	-.0718728	-0.68	.0215138***	3.75
Road(-1)	.003594	0.66	.0120488	1.52	.0044744	0.81
C	.0693408***	5.45	.3819469***	4.65	.073331***	5.24
Number of obs	284		284		284	
F	3155.57		19.57			
Prob > F	0.0000		0.0000			
Wald χ^2					9260.43	
Prob > χ^2					0.0000	
corr(η_i, Xb)			0.8414			
R-squared	0.9759					
Adj R-squared						
R-sq within			0.5682		0.5176	
R-sq between			0.9457		0.9974	
R-sq overall			0.9195		0.9759	
sigma_u			.04197302		.00174571	
sigma_e			.01196973		.01196973	
rho			.92479065		.02082735	

Notes:*, **, *** denote significance at the 90, 95 and 99 % confidence level.

Table A5-3 two-step GMM estimation for FDI stock in overall China

variables	system		system		difference	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
FDI (-1)	.8980634***	23.39	.9397626***	34.64	.5955791***	4.39
Growth(-1)	.0023324**	2.29	.0023071*	2.02	.0011897**	2.08
Trade(-1)	-.0182408	-0.46	-.0063973	-0.17	-.1710075	-1.46
Wage (-1)	-.013512***	-4.31	-.0058651	-1.09	.0073619	0.55
FP(-1)	.0904213**	2.51	.1106536***	2.91	.0498651	1.49
Tech(-1)	.0126064	0.89	.011994	0.66	.0041053	0.31
Rail(-1)	.0428661	0.34	-.0650622	-0.23	-.9363322	-0.98
River(-1)	.0481563	1.11	.0179508	1.33	-.0847925	-0.24
Road(-1)	.0034091	0.37	-.0208291**	-2.15	.0211383	0.69
C	.0813308***	3.00				
No of observation	284		284		257	
F-statistics	859.21		143550.60		25.75	
Prob > F	0.000		0.000		0.000	
AR(1)	-1.00		-0.96		-1.01	
Pr > z	0.315		0.337		0.313	
for AR(2)	-0.26		-0.15		-0.25	
Pr > z	0.798		0.879		0.799	
Hansen test of overid	21.27		23.76		24.85	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	20.49		23.50			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	0.78		0.26			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	18.10		23.08		24.85	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	3.17		0.68		0.000	
Prob > χ^2	0.367		0.878		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A5-4 two-step GMM estimation for FDI stock in overall China

variables	**system**		**system**		**difference**	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
FDI (-1)	1.163724***	3.55	.9677186***	7.11	.5315548*	2.24
Growth(-1)	-.0328662	-1.02	-.0207582	-0.85	-.0587063	-1.28
Trade(-1)	-.0994078	-1.24	.2423656	0.63	5.018868	1.29
Wage (-1)	-.0107528	-0.34	.0355341	1.10	-.6987489	-1.28
FP(-1)	.2043302	1.20	-.0816562	-0.32	-5.260466	-1.27
Tech(-1)	-.3141312	-1.06	-.2902411	-1.07	-.8561234	-1.30
Rail(-1)	(dropped)		-.2420117	-0.21	-1.751598	-0.94
River(-1)	-1.159795	-0.55	-.1300247	-0.12	-22.16256	-1.26
Road(-1)	.0891109	0.43	-.1191157	-1.20	2.200705	1.24
C	.0745677	0.34				
No of observation	97		97		87	
F-statistics	39.26		305915.93		289.35	
Prob > F	0.000		0.000		0.000	
AR(1)	-0.55		-0.92		0.03	
Pr > z	0.582		0.356		0.978	
for AR(2)	0.36					
Pr > z	0.721					
Hansen test of overid	0.00		0.00		0.00	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	0.00		0.00			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	0.00		0.00			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	0.00		0.00		0.00	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.00		-0.00		-0.00	
Prob > χ^2	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A5-5 two-step GMM for FDI stock in hinterland

variables	**system**		**system**		**difference**	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
FDI (-1)	.759181***	3.48	.9611837***	14.78	.6052695***	4.43
Growth(-1)	.0020478	1.61	.0024989	1.55	.001168**	2.12
Trade(-1)	-.0758006	-1.57	-.0206429	-0.41	-.1025204	-1.39
Wage (-1)	-.0023747	-0.13	-.0088029	-0.73	.0110113	0.70
FP(-1)	-.0173971	-0.15	.1448457***	2.99	-.0325868	-0.45
Tech(-1)	.0447434	0.76	.0105334	0.33	.0070971	0.24
Rail(-1)	.6889101	0.15	-.6510183	-0.23	-.1678725	-0.05
River(-1)	-.5137218	-1.02	-.5020886	-0.66	-1.322136	-1.13
Road(-1)	-.0287783	-0.19	.0096567	0.08	-.0232154	-0.20
C	.2656901	1.47				
No of overvation	187		187		170	
F-statistics	60.32		601.58		28.20	
Prob > F	0.000		0.000		0.000	
AR(1)	-0.92		-0.92		-1.03	
Pr > z	0.356		0.357		0.304	
for AR(2)	-0.10		-0.18		0.52	
Pr > z	0.917		0.857		0.603	
Hansen test of overid	8.48		11.72		7.05	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	6.96		11.88			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	1.51		-0.16			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	8.48		9.44		7.05	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.00		2.28		-0.00	
Prob > χ^2	1.000		0.517		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A6-1 The reduced form of ADF and PP test for ln*X* data series in first difference with constant variable and time trend

	ADF		*PP*	
	Coefficient	t-Statistic	Coefficient	t-Statistic
D(LNX(-1),2)	-1.400164***	-6.737995	-1.400164***	-6.737995
C	0.060157	1.173545	0.060157	1.173545
TREND(1980)	-0.004030	-1.399089	-0.004030	-1.399089
R-squared		0.661788		0.661788
Adjusted R-squared		0.633603		0.633603
S.E. of regression		0.116537		0.116537
Sum squared resid		0.325940		0.325940
Log likelihood		21.31653		21.31653
F-statistic		23.48066		23.48066
Prob(F-statistic)		0.000002		0.000002
Mean dependent var		-0.007351		-0.007351
S.D. dependent var		0.192525		0.192525
Akaike info criterion		-1.356780		-1.356780
Schwarz criterion		-1.212798		-1.212798
Hannan-Quinn criter.		-1.313967		-1.313967
Durbin-Watson stat		2.044761		2.044761

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

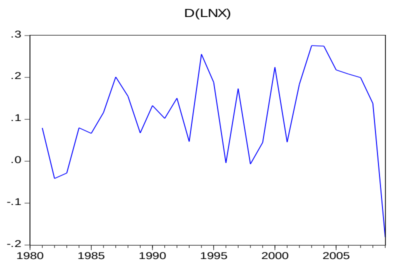

Figure A6-1 lnx at first difference

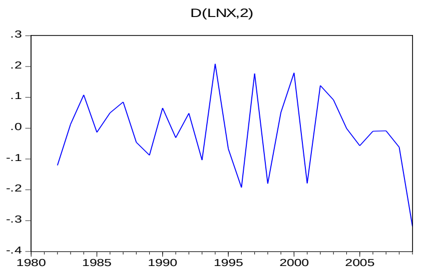

Figure A6-2 lnX at secondary difference

Table A6-2 unit root in detail for data series LNFDISin in first difference with a constant and time trend

	ADF		*PP*	
	Coefficient	*t*-Statistic	Coefficient	*t*-Statistic
D(LNFDISIN(-1))	-0.623347***	-3.410412	-0.623347***	-3.410412
C	0.218743***	2.945389	0.218743***	2.945389
TREND(1980)	-0.006677**	-2.240046	-0.006677**	-2.240046
R-squared		0.317578		0.317578
Adjusted R-squared		0.262985		0.262985
S.E. of regression		0.097485		0.097485
Sum squared resid		0.237583		0.237583
Log likelihood		27.04192		27.04192
F-statistic		5.817121		5.817121
Prob(F-statistic)		0.008427		0.008427
Mean dependent var		0.003003		0.003003
S.D. dependent var		0.113553		0.113553
Akaike info criterion		-1.717280		-1.717280
Schwarz criterion		-1.574544		-1.574544
Hannan-Quinn criter.		-1.673644		-1.673644
Durbin-Watson stat		1.906569		1.906569

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

Table A6-3 unit root test for lnfdisout with a constant and time trend

	LEVEL				*FIRIST DIFFERENCE*	
	ADF		PP		PP	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
LNFDISOUT(-1)	-0.270492***	-5.440943	-0.164274***	-2.712492		
D(LNFDISOUT(-1))	0.096745	0.725450			-0.795127***	-4.072770
C	1.401556***	6.974356	0.993477***	4.936590	0.477922***	3.001519
TREND(1980)	0.041099***	3.583441	0.022588	1.501509	-0.015191**	-2.072659
R-squared		0.689672		0.367179		0.408866
Adjusted R-squared		0.649194		0.316553		0.359605
S.E. of regression		0.175232		0.242913		0.259427
Sum squared resid		0.706241		1.475162		1.615260
Log likelihood		10.87775		1.477834		-0.290739
F-statistic		17.03835		7.252822		8.299970
Prob(F-statistic)		0.000005		0.003281		0.001821
Mean dependent var		0.291767		0.283214		0.014002
S.D. dependent var		0.295855		0.293831		0.324184
Akaike info criterion		-0.509463		0.108726		0.243758
Schwarz criterion		-0.317487		0.251462		0.387740
Hannan-Quinn criter.		-0.452378		0.152362		0.286572
Durbin-Watson stat		1.937117		1.611726		1.389230

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

Table A6-4 unit root test for data series LND with a constant and time trend

Level			*First level*				
	ADF			PP		PP	
	Coefficient	t-Statistic		Coefficient	t-Statistic	Coefficient	t-Statistic
LND(-1)	-0.533442***	-3.880311	D(LND(-1))	-0.724689***	-2.955432	-0.746787**	-2.573113
D(LND(-1))	0.453976*	1.908320					
C	2.364803***	3.911781	C	0.027523	1.253052	0.022430	0.551078
TREND(1980)	0.028290***	3.772935	TREND(1980)			0.000400	0.149813
R-squared		0.414452	R-squared		0.251466		0.252138
Adjusted R-squared		0.341259	Adjusted R-squared		0.222677		0.192309
S.E. of regression		0.078613	S.E. of regression		0.096394		0.098259
Sum squared resid		0.148320	Sum squared resid		0.241587		0.241371
Log likelihood		33.63797	Log likelihood		26.80792		26.82048
F-statistic		5.662424	F-statistic		8.734577		4.214308
Prob(F-statistic)		0.004433	Prob(F-statistic)		0.006556		0.026471
Mean dependent var		0.041301	Mean dependent var		-0.008745		-0.008745
S.D. dependent var		0.096858	S.D. dependent var		0.109333		0.109333
Akaike info criterion		-2.116998	Akaike info criterion		-1.771994		-1.701463
Schwarz criterion		-1.926683	Schwarz criterion		-1.676837		-1.558727
Hannan-Quinn criter.		-2.058817	Hannan-Quinn criter.		-1.742903		-1.657827
Durbin-Watson stat		1.780659	Durbin-Watson stat		1.457461		1.444293

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

Table A6-5 unit root of data series at level with a constant and time trend

	ADF		*PP*	
	Coefficient	t-Statistic	Coefficient	t-Statistic
LNS(-1)	-0.409000***	-3.241826	-0.409000***	-3.241826
C	1.827061***	3.257657	1.827061***	3.257657
TREND(1980)	0.022908***	3.383744	0.022908***	3.383744
R-squared		0.305795		0.305795
Adjusted R-squared		0.252394		0.252394
S.E. of regression		0.082673		0.082673
Sum squared resid		0.177706		0.177706
Log likelihood		32.72711		32.72711
F-statistic		5.726447		5.726447
Prob(F-statistic)		0.008696		0.008696
Mean dependent var		0.038486		0.038486
S.D. dependent var		0.095616		0.095616
Akaike info criterion		-2.050145		-2.050145
Schwarz criterion		-1.908701		-1.908701
Hannan-Quinn criter.		-2.005847		-2.005847
Durbin-Watson stat		1.453293		1.453293

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

Table A6-6 unit root for data series of LNTG at level with a constant and time trend

	ADF		*PP*	
	Coefficient	t-Statistic	Coefficient	t-Statistic
LNTG(-1)	-0.880265***	-3.442652	-1.315678***	-6.217892
D(LNTG(-1))	0.092640	0.387891		
D(LNTG(-2))	0.580093***	3.313184		
C	8.841162***	3.332907	12.88282***	6.025402
TREND(1980)	-0.250753***	-3.432027	-0.364657***	-5.996727
R-squared		0.861931		0.648977
Adjusted R-squared		0.829444		0.615546
S.E. of regression		0.272726		0.430366
Sum squared resid		1.264453		3.889515
Log likelihood		0.203784		-12.21729
F-statistic		26.53160		19.41257
Prob(F-statistic)		0.000000		0.000017
Mean dependent var		-0.271424		-0.264494
S.D. dependent var		0.660378		0.694090
Akaike info criterion		0.436020		1.268108
Schwarz criterion		0.683984		1.415365
Hannan-Quinn criter.		0.494433		1.307175
Durbin-Watson stat		1.634651		1.458852

*** indicates the statistic value are significant at the 99%, ** significant at 95%, * significant at 90%.

Table A6-7 The *F*-statistics results of ARDL-OLS estimation for exporting

	NONE	*INPT*	*INPT +T*
1	2.3150[.096]	5.1890[.006]	***4.4393[.016]***
2	1.5632[.301]	5.2229[.007]	30.9703[.003]

P indicates the maximum lag order. [.] indicates the p-value of the F-statistic results

Table A6-8 The ARDL lag order selection

P		*NONE*	*INPT*	*INPT +T*
1	AIC	(1,0,0,1,0,0)	(0,0,1,0,1,1)	***(1,1,0,1,0,0)***
	SBC	(1,0,0,1,0,0)	(0,0,1,0,1,1)	***(1,1,0,1,0,0)***
2	AIC	n.a.	(1,0,0,2,1,1)	(2,2,0,2,1,0)
	SBC	n.a.	(1,0,0,2,0,0)	(2,2,0,2,1,0)

P indicates the maximum lag order

Table A6-9 The *F*-statistic results of ARDL-OLS estimation for imports

P	*NONE*	*INPT*	*INPT +T*
1	1.6748[.217]	.95741[.498]	***7.3676[.004]***
2	-2.2716[.037]	1.9424[.313]	3.7792[.224]

P indicates the maximum lag order; [.] indicates the p-value of the F-statistic results

Table A6-10 The ARDL lag order selection for imports

P		*NONE*	*INPT*	*INPT +T*
1	AIC	n.a.	n.a.	***(1,1,1,1,0,1)***
	SBC	n.a.	n.a.	***(1,1,1,1,0,1)***
2	AIC	(2,2,0,2,1,2)	n.a.	n.a.
	SBC	(2,1,0,0,1,1)	n.a.	n.a.

P indicates the maximum lag order

Table A6-11 Japan exports share

	China	*Hong Kong*	*Taiwan*	*India*	*Korea*	*Russia*	*United States*	*ASEAN*	*EU*	*rest*
1995	0.113096	0.087879	0.100945	0.008504	0.104581	0.003068	0.148643	0.219278	0.08467	0.277979
1996	0.114337	0.088671	0.087772	0.009222	0.104414	0.002826	0.156022	0.218465	0.080883	0.29341
1997	0.114305	0.089992	0.089419	0.009133	0.093346	0.002451	0.165728	0.211038	0.081164	0.423458
1998	0.114963	0.085088	0.090577	0.009468	0.060272	0.002687	0.215454	0.158376	0.101301	0.492231
1999	0.132542	0.078786	0.090002	0.009658	0.088453	0.002677	0.178254	0.183144	0.097843	0.449437
2000	0.148323	0.076077	0.089346	0.009384	0.101487	0.002276	0.165032	0.190537	0.091281	0.439611
2001	0.166165	0.067597	0.071907	0.008687	0.102535	0.002085	0.160247	0.180539	0.098153	0.468497
2002	0.177515	0.069321	0.075596	0.007547	0.119539	0.001878	0.146168	0.185941	0.08535	0.454828
2003	0.193925	0.064893	0.080194	0.008577	0.122697	0.003515	0.131594	0.184353	0.0832	0.452571
2004	0.199475	0.060882	0.084759	0.008375	0.131467	0.004386	0.121788	0.189722	0.082711	0.437698
2005	0.196888	0.053429	0.089474	0.008553	0.13131	0.003259	0.11623	0.195558	0.078854	0.439563
2006	0.202001	0.04963	0.085183	0.011036	0.133922	0.00453	0.115097	0.183829	0.076768	0.455103
2007	0.200859	0.047044	0.083644	0.014404	0.138356	0.005927	0.10025	0.190905	0.080862	0.438858
2008	0.204479	0.039787	0.080171	0.014651	0.144455	0.007987	0.089002	0.209562	0.073879	0.429507
2009	0.227554	0.038965	0.077859	0.018812	0.146794	0.005796	0.083621	0.189017	0.069425	0.453333
Total	2.506427	0.998041	1.276848	0.156011	1.723628	0.055348	2.093131	2.890263	1.266345	6.633517
average	0.167095	0.066536	0.085123	0.010401	0.114909	0.00369	0.139542	0.192684	0.084423	0.442234

Data source: IMF trade statistics

Table A6-12 Taiwan exports share

	China	*Hong Kong*	*India*	*Japan*	*Korea*	*Russia*	*United States*	*ASEAN*	*EU*	*rest*
1995	0.00245	0.365118	0.00582	0.074389	0.032117	0.000514	0.151736	0.150033	0.088034	0.281525
1996	0.003924	0.36843	0.004139	0.068533	0.026545	0.000877	0.146078	0.153374	0.086596	0.287582
1997	0.004388	0.356215	0.004624	0.065936	0.019033	0.000955	0.145428	0.153375	0.091862	0.303613
1998	0.005906	0.338306	0.006398	0.055927	0.010306	0.000908	0.167383	0.131208	0.11879	0.332253
1999	0.017099	0.325907	0.007232	0.056953	0.01684	0.000845	0.175345	0.146357	0.100787	0.32798
2000	0.021507	0.322517	0.007686	0.058334	0.016551	0.001348	0.17012	0.155253	0.094437	0.322368
2001	0.031059	0.323166	0.008802	0.056338	0.014623	0.002213	0.167488	0.157687	0.08988	0.316232
2002	0.065666	0.315139	0.007119	0.05095	0.014932	0.002056	0.168596	0.156371	0.083372	0.304395
2003	0.157166	0.245557	0.007401	0.052519	0.01623	0.002362	0.152278	0.148857	0.087608	0.282299
2004	0.185118	0.193411	0.00817	0.0548	0.017489	0.002819	0.169128	0.154326	0.08841	0.295457
2005	0.219575	0.173179	0.008132	0.061033	0.019708	0.002697	0.157516	0.155601	0.083064	0.277012
2006	0.222883	0.147237	0.007278	0.055122	0.025744	0.003003	0.170421	0.152824	0.096692	0.289217
2007	0.219746	0.128766	0.008837	0.051893	0.024117	0.004326	0.145851	0.177198	0.108897	0.27622
2008	0.193234	0.112264	0.010152	0.060133	0.026623	0.004137	0.14094	0.202316	0.106168	0.284974
2009	0.214463	0.104519	0.013689	0.061011	0.034197	0.003048	0.115475	0.210296	0.103434	0.255344
Total	1.564184	3.819731	0.115479	0.883868	0.315055	0.032106	2.343785	2.405076	1.428031	4.436469
Average	0.104279	0.254649	0.007699	0.058925	0.021004	0.00214	0.156252	0.160338	0.095202	0.295765

Data source: IMF trade statistics

Table A5-13 Korea exports share

	China	*Hong Kong*	*Taiwan*	*India*	*Japan*	*Russia*	*United States*	*ASEAN*	*EU*	*rest*
1995	0.119236	0.160668	0.029617	0.0098	0.128509	0.003278	0.084068	0.153039	0.083816	0.312036
1996	0.154294	0.159646	0.025665	0.008982	0.110934	0.005018	0.08626	0.158813	0.075805	0.300842
1997	0.160369	0.138615	0.027417	0.010049	0.103533	0.005405	0.093001	0.157925	0.074842	0.482216
1998	0.150672	0.125665	0.03194	0.016575	0.086627	0.003924	0.128867	0.107944	0.10306	0.524264
1999	0.162617	0.111841	0.030188	0.013289	0.087278	0.004205	0.128899	0.125779	0.085159	0.542261
2000	0.173604	0.106688	0.028024	0.011168	0.093687	0.004699	0.130453	0.129622	0.086669	0.539444
2001	0.190962	0.096133	0.02636	0.01169	0.087151	0.00608	0.12898	0.133813	0.081983	0.55679
2002	0.202397	0.0876	0.026356	0.011539	0.076487	0.005954	0.133893	0.14751	0.078047	0.566507
2003	0.239866	0.082082	0.026708	0.01271	0.085197	0.006409	0.114332	0.137535	0.078391	0.570968
2004	0.233425	0.072717	0.032588	0.018174	0.102063	0.005616	0.122404	0.136483	0.075911	0.556448
2005	0.229022	0.061794	0.034031	0.02318	0.112453	0.013472	0.12381	0.138079	0.070148	0.546845
2006	0.20503	0.053818	0.039877	0.023923	0.099928	0.015289	0.122709	0.144031	0.083853	0.539281
2007	0.185338	0.048656	0.039134	0.033254	0.100833	0.007475	0.107309	0.15551	0.102765	0.512372
2008	0.173208	0.036267	0.037509	0.035019	0.105748	0.009047	0.108364	0.175075	0.095214	0.506121
2009	0.201912	0.037063	0.03026	0.041658	0.090251	0.007015	0.082685	0.176661	0.08185	0.535241
Total	2.781953	1.379253	0.465672	0.281011	1.470678	0.102887	1.696034	2.177819	1.257513	7.865168
Average	0.185464	0.09195	0.031045	0.018734	0.098045	0.006859	0.113069	0.145188	0.083834	0.524345

Data source: IMF trade stastics

Table A6-14 US imports share

	China	*Hong Kong*	*Taiwan*	*India*	*Japan*	*Korea*	*Russia*	*ASEAN*	*EU*	*rest*
1995	0.04918	0.006448	0.042611	0.028892	0.08308	0.025461	0.030699	0.029196	0.224365	0.480067
1996	0.051304	0.006731	0.041353	0.028544	0.078628	0.024704	0.025221	0.029879	0.229187	0.48445
1997	0.058667	0.006581	0.040787	0.03073	0.077955	0.025413	0.030016	0.030222	0.222376	0.53592
1998	0.064076	0.00639	0.038191	0.032619	0.082843	0.031669	0.036317	0.030917	0.211985	0.529068
1999	0.074722	0.006448	0.03915	0.035631	0.067732	0.030723	0.029515	0.033616	0.201378	0.555807
2000	0.081099	0.006907	0.036951	0.036295	0.060838	0.029395	0.034213	0.032233	0.203258	0.559909
2001	0.092216	0.006907	0.034078	0.032066	0.056576	0.02786	0.024938	0.030225	0.202948	0.584401
2002	0.109898	0.005663	0.033786	0.040711	0.052222	0.02849	0.020887	0.029461	0.188512	0.600268
2003	0.128312	0.004861	0.032573	0.039706	0.050735	0.026026	0.018957	0.028168	0.187947	0.611027
2004	0.135234	0.003827	0.032574	0.038519	0.045319	0.025388	0.027949	0.027284	0.181755	0.617385
2005	0.154797	0.003653	0.029305	0.037331	0.04291	0.026436	0.025044	0.025584	0.178117	0.631618
2006	0.17063	0.00327	0.029602	0.036389	0.040269	0.026525	0.030919	0.026516	0.166502	0.640008
2007	0.18551	0.002679	0.027967	0.038615	0.038011	0.025112	0.022988	0.025962	0.16957	0.649095
2008	0.196518	0.003375	0.026408	0.043172	0.038423	0.027956	0.022915	0.025431	0.161442	0.650878
2009	0.217145	0.002552	0.02546	0.047598	0.044226	0.027596	0.016791	0.027978	0.156872	0.650926
Total	1.769309	0.076294	0.510798	0.54682	0.859767	0.408753	0.39737	0.432673	2.886215	8.881311
Average	0.117954	0.005086	0.034053	0.036455	0.057318	0.02725	0.026491	0.028845	0.192414	0.592087

Data source: IMF trade statistics

Table A6-15 EU imports share

	China	*Hong Kong*	*Taiwan*	*India*	*Japan*	*Korea*	*Russia*	*United States*	*ASEAN*	*EU*	*rest*
1995	0.012549	0.002524	0.006918	0.010258	0.013076	0.005234	0.023572	0.031977	0.012809	0.722558	0.190501
1996	0.013316	0.002746	0.007284	0.01094	0.012224	0.005532	0.019491	0.034425	0.012959	0.746473	0.169035
1997	0.015304	0.003244	0.007928	0.011442	0.012121	0.006061	0.021292	0.038	0.013687	0.736474	0.187752
1998	0.016548	0.003059	0.009165	0.011802	0.013171	0.008214	0.019294	0.038528	0.013657	0.732356	0.189283
1999	0.018815	0.003452	0.008531	0.01132	0.013639	0.007662	0.018177	0.036058	0.01393	0.729087	0.194202
2000	0.023779	0.002913	0.008682	0.012172	0.01344	0.007834	0.024143	0.036722	0.014186	0.703884	0.212747
2001	0.025706	0.002883	0.007498	0.012288	0.013577	0.00721	0.019592	0.037935	0.013675	0.727133	0.196143
2002	0.027306	0.003484	0.006729	0.01214	0.011839	0.006462	0.020378	0.031143	0.012519	0.726866	0.199583
2003	0.031013	0.0021	0.006584	0.012345	0.011145	0.006068	0.020929	0.025627	0.011702	0.732785	0.196341
2004	0.035606	0.002352	0.00649	0.013314	0.010704	0.005724	0.025043	0.022583	0.011054	0.721484	0.203836
2005	0.043745	0.002268	0.005882	0.01349	0.010046	0.005738	0.02621	0.023534	0.010245	0.711276	0.214844
2006	0.050976	0.002368	0.005869	0.013683	0.009193	0.005965	0.027951	0.024138	0.010274	0.695515	0.229182
2007	0.063271	0.002067	0.006396	0.014611	0.009068	0.007131	0.027542	0.023008	0.010358	0.680625	0.242204
2008	0.065938	0.002365	0.005979	0.014996	0.009223	0.007401	0.025277	0.02362	0.010074	0.689078	0.235609
2009	0.064934	0.003397	0.006281	0.014622	0.009983	0.007418	0.022869	0.023401	0.010331	0.704594	0.220504
Total	0.508804	0.041221	0.106214	0.189423	0.172448	0.099655	0.341761	0.450698	0.18146	10.76019	3.10763
Average	0.03392	0.002748	0.007081	0.012628	0.011497	0.006644	0.022784	0.030047	0.012097	0.717346	0.207175

Data source: IMF trade statistics

Table A6-16 Japan imports share

	China	*Hong Kong*	*Taiwan*	*India*	*Korea*	*Russia*	*United States*	*ASEAN*	*EU*	*rest*
1995	0.132472	0.006195	0.047945	0.030871	0.0898	0.050841	0.123833	0.119003	0.145689	0.377183
1996	0.126816	0.005322	0.047331	0.028162	0.079754	0.039831	0.1311	0.142052	0.149214	0.381518
1997	0.144382	0.004808	0.049683	0.023335	0.078015	0.046432	0.125983	0.145975	0.13098	0.520773
1998	0.15495	0.004146	0.047079	0.021425	0.080869	0.042484	0.133088	0.122842	0.140748	0.540407
1999	0.161606	0.005146	0.043959	0.025517	0.081158	0.05321	0.116497	0.151032	0.132697	0.507283
2000	0.174565	0.004676	0.042851	0.020787	0.081456	0.064014	0.109146	0.140707	0.127731	0.517777
2001	0.200285	0.005339	0.038334	0.020911	0.076129	0.054897	0.109311	0.14623	0.13105	0.527111
2002	0.227574	0.006331	0.038582	0.021826	0.070133	0.045172	0.101495	0.152798	0.13166	0.533498
2003	0.245624	0.004835	0.037833	0.020211	0.073222	0.046396	0.087203	0.14796	0.133412	0.536133
2004	0.256506	0.004226	0.037048	0.01939	0.082352	0.048431	0.075487	0.14525	0.121944	0.541359
2005	0.276077	0.004326	0.042595	0.016356	0.091926	0.042509	0.075113	0.134254	0.11257	0.555464
2006	0.270749	0.00324	0.038002	0.015112	0.082208	0.048712	0.075197	0.137566	0.103597	0.571562
2007	0.26004	0.002501	0.035728	0.01435	0.085589	0.051148	0.069299	0.128309	0.099834	0.582541
2008	0.270104	0.002339	0.036156	0.01434	0.08957	0.049099	0.065316	0.121937	0.096825	0.589735
2009	0.323363	0.002697	0.043239	0.012171	0.093979	0.026274	0.069513	0.1472	0.095369	0.579071
Total	3.225111	0.066126	0.626366	0.304765	1.23616	0.70945	1.467582	2.083112	1.853319	8.120702
Average	0.215007	0.004408	0.041758	0.020318	0.082411	0.047297	0.097839	0.138874	0.123555	0.54138

Data source: IMF trade statistics

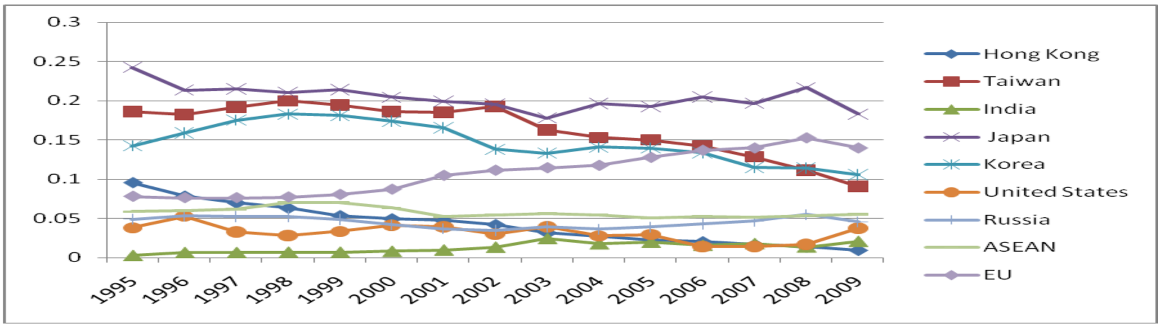

Figure A6-3 Mean trade source regions of China

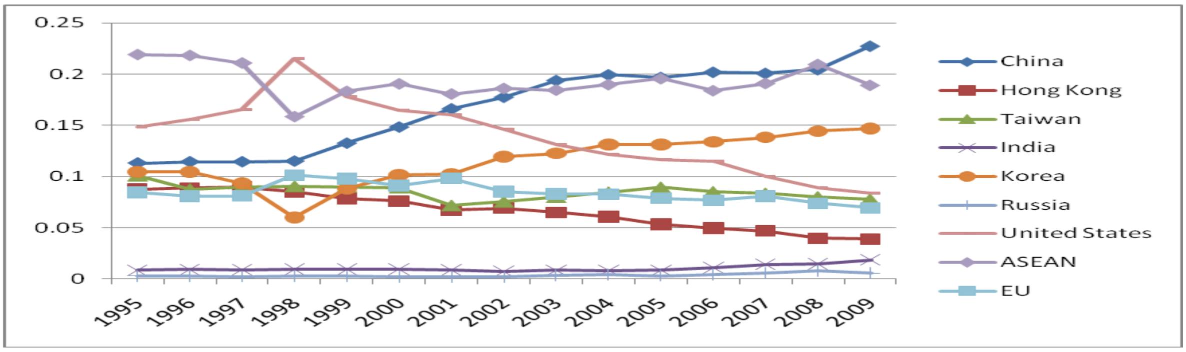

Figure A6-4 Japan export share

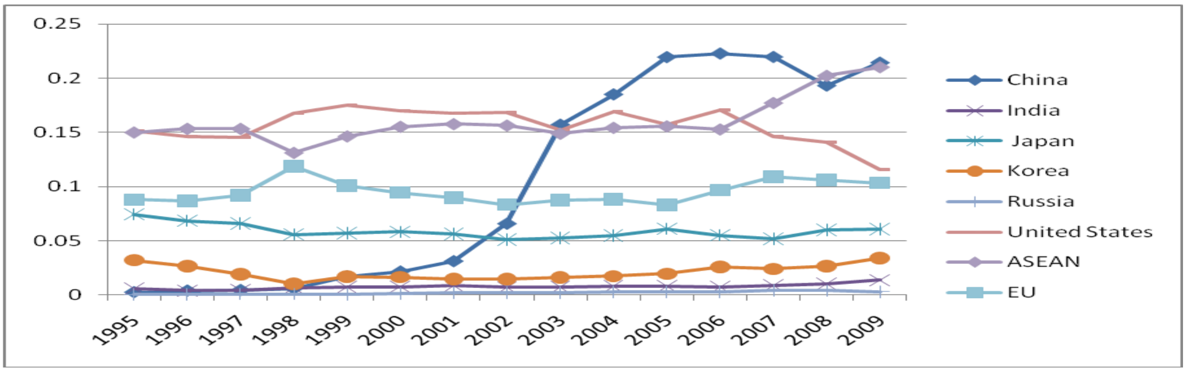

Figure A6-5 Taiwan export share

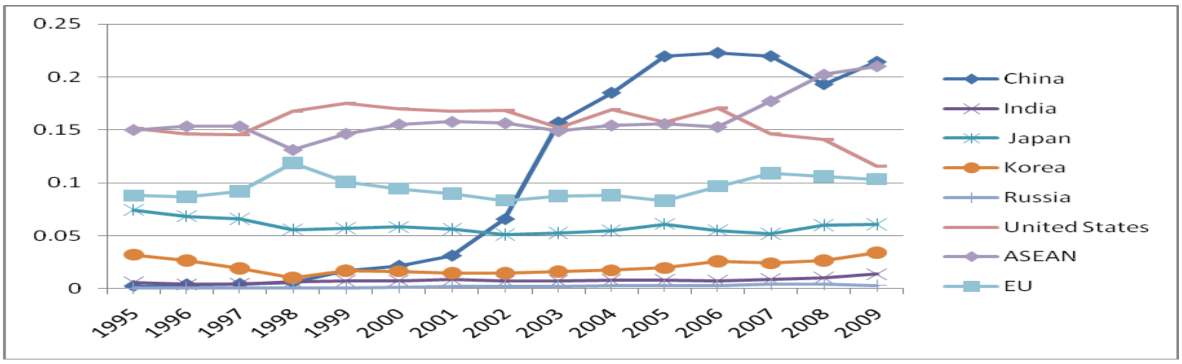

Figure A6-6 Korea exports share

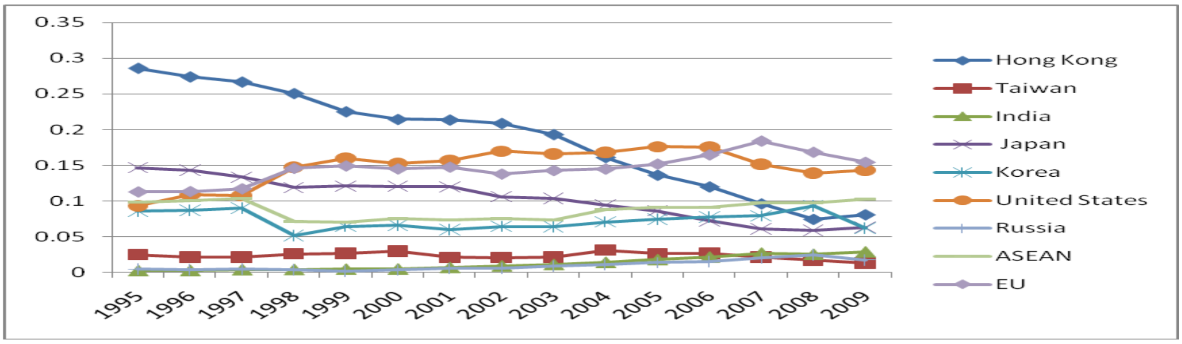

Figure A6-7 Chinese exports destination share

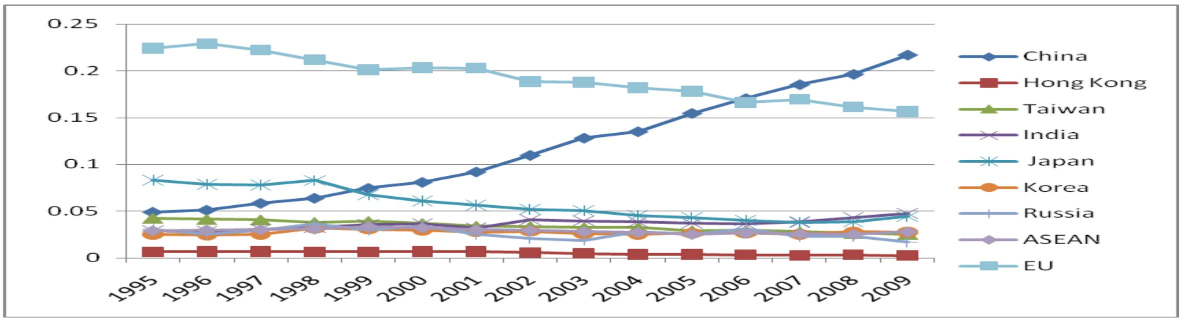

Figure A6-8 US imports share

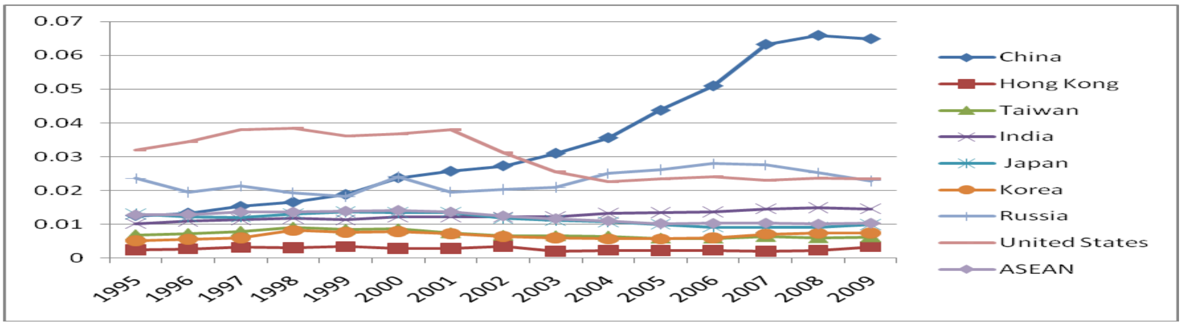

Figure A6-9 EU imports share

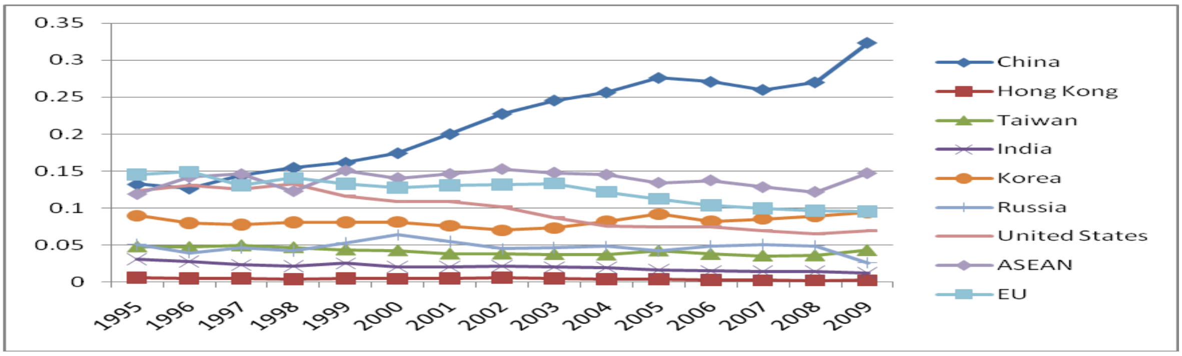

Figure A6-10 Japan imports share

Table A7-1 POOL, fixed effect, Random effect regression

variables	OLS POOL		Fixed Effect		Random Effect	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	.2890517***	6.55	.120605**	2.40	.2890517***	6.55
L_{t-1}	-.1597468**	-2.24	-.0921415	-1.27	-.1597468**	-2.24
H_{t-1}	.994926**	2.26	2.846552***	3.83	.994926**	2.26
$(I/Y)_{t-1}$	.0185294**	2.00	.0208455	1.36	.0185294**	2.00
C	-.7258831**	-2.03	-1.603183***	-2.88	-.7258831**	-2.03
Number of obs	280		280		280	
F	41.22		49.70			
Prob > F	0.0000		0.0000			
Wald chi2(4)					164.90	
Prob > F					0.0000	
R-squared	0.3749					
Adj R-squared	0.3658					
R-sq: within			0.4449		0.3888	
between			0.0771		0.3458	
overall			0.3101		0.3749	
corr(u_i, Xb)			-0.5019			
sigma_u			.21020885		0	
sigma_e			.31918146		.31918146	
rho			.30252211		0	
F test that all u_i=0:			2.08			
Prob > F			0.0020			
LM heteroskedaticity			66.55			
Prob chi2(4)			0.0000			
Hauman test			29.20			
Prob chi2(4)			0.0000			

Notes:*, **, *** denote significance at the 90, 95 and 99 % confidence level

Table A7-2 OLS POOL, FE, RE approach with robust

variables	*OLS POOL*		*Fixed Effect*		*Random Effect*	
	Coefficient.	t-Statics	Coefficient.	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	.2890517***	6.20	.120605**	2.43	.2890517***	6.55
L_{t-1}	-.1597468**	-2.90	-.0921415	-1.74	-.1597468**	-2.24
H_{t-1}	.994926**	2.43	2.846552***	4.44	.994926**	2.26
$(I/Y)_{t-1}$	.0185294**	2.22	.0208455	1.69	.0185294**	2.00
C	-.7258831**	-2.30	-1.603183***	-3.55	-.7258831**	-2.03
Number of obs	280		280		280	
F	41.22		49.70			
Prob > F	0.0000		0.0000			
Wald chi2(4)					3630.69	
Prob > F					0.0000	
R-squared	0.3749					
Adj R-squared	0.3658					
R-sq: within			0.4449		0.3888	
between			0.0771		0.3458	
overall			0.3101		0.3749	
corr(u_i, Xb)			-0.5019			
sigma_u			.21020885		0	
sigma_e			.31918146		.31918146	
rho			.30252211		0	
F test that all u_i=0:			2.08			
Prob > F			0.0020			

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-3 Two-step GMM regression

variables	System GMM		System GMM		Difference GMM	
	Coefficient.	t-Statics	Coefficient.	t-Statics	Coefficient.	t-Statics
$y_{0,\ t-1}$	.286775***	3.50	.3232314***	4.82	.173332**	2.21
L_{t-1}	-.1485972*	-1.95	-.1437531**	-1.88	-.0873401	-1.60
H_{t-1}	1.2002	1.04	2.273244***	2.85	5.17825***	5.82
$(I/Y)_{t-1}$	.0177721	0.72	-.0065237	-0.88	.0033228	0.14
C	-.7900483	-0.92				
No of observation	280		280		224	
Number of instruments	113		112		93	
F-statistics	18.32		502.01		17.74	
Prob > F	0.000		0.000		0.000	
AR(1)	-3.06		-3.11		-2.94	
Pr > z	0.002		0.002		0.003	
for AR(2)	-0.15		-0.11		-0.56	
Pr > z	0.881		0.910		0.578	
Sargan test of overid. restrictions	232.25		226.16		102.42	
Prob > χ^2	0.000		0.000		0.157	
Hansen test of overid	26.02		26.09		26.52	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	25.26		23.24			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	0.75		2.86			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	26.68		25.62		25.70	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.67		0.47		0.82	
Prob > χ^2	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-4 the result of one-step GMM total investment and total trade

Variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2651***	5.43	0.2902***	5.54	0.1233**	2.08
L_{t-1}	-0.1378**	-2.50	-0.1433**	-2.55	-0.0944*	-1.92
H_{t-1}	0.8402	1.08	1.7902***	3.43	3.9338***	5.05
$(I/Y)_{t-1}$	0.0248***	1.76	0.0004	0.08	0.0419**	2.56
$(Trade/Y)_{t-1}$	-0.0010	-0.26	-0.0028	-0.80	0.0003	0.12
C	-0.9424*	-2.01				
No of overvation	280		280		224	
Number of instruments	172		171		142	
F-statistics	37.05		858.04		27.28	
Prob > F	0.000		0.000		0.000	
AR(1)	-3.60		-3.58		-3.37	
Pr > z	0.000		0.000		0.001	
for AR(2)	-0.14		-0.09		-0.61	
Pr > z	0.889		0.926		0.539	
Sargan test of overid. restrictions	285.85		282.37		148.77	
Prob > χ2	0.000		0.000		0.232	
Hansen test of overid	25.58		25.64		25.68	
Prob > χ2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	25.46		25.57			
Prob > χ2	1.000		1.000			
Difference (null H = exogenous):	0.12		0.06			
Prob > χ2	1.000		1.000			
Iv						
Hansen test excluding group:	25.31		25.64		25.68	
Prob > χ2	1.000		1.000		1.000	
Difference (null H = exogenous):	0.27		0.00		-0.00	
Prob > χ2	0.876		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-5 One-step total GMM FDI and trade by multinationals

Variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2866***	4.35	0.2770***	5.95	0.1637	1.76
L_{t-1}	-0.1743***	-3.23	-0.1713***	-1.63	-0.1092**	-2.71
H_{t-1}	1.3695**	2.67	1.2213**	5.40	2.6621***	4.40
$(I_f/Y)_{t-1}$	0.0024	0.25	0.0075**	0.60	0.0349**	2.25
$(Trade_f/Y)_{t-1}$	-0.0067***	-4.38	-0.0059***	-2.23	-0.0023***	-2.12
C	0.2367	0.67				
No of overvation	110		110		88	
Number of instruments	102		101		85	
F-statistics	21.95		997.27		111.18	
Prob > F	0.000		0.000		0.000	
AR(1)	-2.66		-2.66		-2.78	
Pr > z	0.008		0.008		0.005	
for AR(2)	-0.17		-0.18		-0.47	
Pr > z	0.866		0.855		0.635	
Sargan test of overid. restrictions	153.98		155.36		100.40	
Prob > $\chi 2$	0.000		0.000		0.061	
Hansen test of overid	9.73		10.61		8.65	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	9.73		10.61			
Prob > $\chi 2$	1.000		1.000			
Difference (null H = exogenous):	0.00		0.00			
Prob > $\chi 2$	1.000		1.000			
Iv						
Hansen test excluding group:	9.73		10.61		8.65	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference (null H = exogenous):	0.00		0.00		-0.00	
Prob > $\chi 2$	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-6 One-step GMM estimation results for coastal area

variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.3224***	5.02	0.3109***	4.76	0.1602*	1.36
L_{t-1}	-0.1745***	-3.27	-0.1723***	-3.22	-0.1001**	-2.50
H_{t-1}	1.1013*	1.95	1.1960**	2.93	2.5139***	2.93
$(I/Y)_{t-1}$	0.0029	0.23	0.0028	0.74	0.0403***	3.74
C	0.0332	0.07				
No of overvation	110		110		88	
Number of instruments	89		88		74	
F-statistics	13.93		865.25		12.14	
Prob > F	0.000		0.000		0.001	
AR(1)	-2.63		-2.63		-2.75	
Pr > z	0.009		0.008		0.006	
for AR(2)	-0.06		-0.07		-0.46	
Pr > z	0.955		0.942		0.646	
Sargan test of overid. restrictions	152.40		151.60		95.76	
Prob > χ^2	0.000		0.000		0.022	
Hansen test of overid	10.13		10.45		10.10	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests	0.00				0.00	
Level Hansen test excluding group:	1.000		10.45		1.000	
Prob > χ^2	10.13		1.000			
Difference (null H = exogenous):	1.000		0.00			
Prob > χ^2	0.00		1.000			
Iv	1.000					
Hansen test excluding group:	10.13		10.45		10.10	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	0.00		0.00		0.00	
Prob > χ^2	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-7 One-step GMM results with international trade

variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2651***	5.43	0.2902***	5.54	0.1233**	2.08
L_{t-1}	-0.1378**	-2.50	-0.1433**	-2.55	-0.0944*	-1.92
H_{t-1}	0.8402	1.08	1.7902***	3.43	3.934***	5.05
$(I/Y)_{t-1}$	0.0248***	1.76	0.0004	0.08	0.0419**	2.56
$(Trade/Y)_{t-1}$	-0.0010	-0.26	-0.0028	-0.80	0.0003	0.12
C	-0.9424*	-2.01				
No of overvation	280		280		224	
Number of instruments	172		171		142	
F-statistics	37.05		858.04		27.28	
Prob > F	0.000		0.000		0.000	
AR(1)	-3.60		-3.58		-3.37	
Pr > z	0.000		0.000		0.001	
for AR(2)	-0.14		-0.09		-0.61	
Pr > z	0.889		0.926		0.539	
Sargan test of overid. restrictions	285.85		282.37		148.77	
Prob > $\chi 2$	0.000		0.000		0.232	
Hansen test of overid	25.58		25.64		25.68	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	25.46		25.57			
Prob > $\chi 2$	1.000		1.000			
Difference (null H = exogenous):	0.12		0.06			
Prob > $\chi 2$	1.000		1.000			
Iv						
Hansen test excluding group:	25.31		25.64		25.68	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference (null H = exogenous):	0.27		0.00		-0.00	
Prob > $\chi 2$	0.876		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-8 One-step coastal GMM with FDI and trade by FDI

variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2909**	2.90	0.2986***	3.19	0.1337	1.09
L_{t-1}	-0.1387**	-2.27	-0.1458**	-2.45	-0.0842	-1.11
H_{t-1}	1.5570***	4.41	1.6766***	4.15	2.8764**	2.76
$(I_f/Y)_{t-1}$	0.0035	0.85	0.0071*	1.80	0.0271	1.43
$(Trade_f/Y)_{t-1}$	-0.0076	-1.58	-0.0084	-1.55	-0.0169	-0.87
C	0.3286	0.71				
No of overvation	121		121		110	
Number of instruments	119		118		107	
F-statistics	17.04		853.52		14.13	
Prob > F	0.000		0.000		0.000	
AR(1)	-2.04		-2.00		-2.25	
Pr > z	0.041		0.045		0.025	
for AR(2)	-0.26		-0.25		-0.71	
Pr > z	0.793		0.804		0.476	
Sargan test of overid. restrictions	118.47		117.40		109.74	
Prob > $\chi 2$	0.344		0.369		0.283	
Hansen test of overid	8.42		8.39		10.06	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	8.42		8.39			
Prob > $\chi 2$	1.000		1.000			
Difference (null H = exogenous):	0.00		0.00			
Prob > $\chi 2$	1.000		1.000			
Iv						
Hansen test excluding group:	8.42		8.39		10.06	
Prob > $\chi 2$	1.000		1.000		1.000	
Difference (null H = exogenous):	0.00		0.00		0.00	
Prob > $\chi 2$	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-9 Hinterland One-step GMM of basic model

Variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2108***	4.07	0.2626***	3.89	0.1045	1.46
L_{t-1}	0.0443	0.06	0.0278	0.19	-0.0471	-0.41
H_{t-1}	1.2820	2.23	2.9574***	3.20	6.8274***	5.32
$(I/Y)_{t-1}$	0.0362**	0.84	-0.0106	-1.29	-0.0043	-0.16
C	-1.7414***	-3.50				
No of overvation	170		170		136	
Number of instruments	109		108		89	
F-statistics	58.15		370.84		17.33	
Prob > F	0.000		0.000		0.000	
AR(1)	-3.19		-3.17		-2.88	
Pr > z	0.001		0.002		0.004	
for AR(2)	-0.19		-0.13		-0.61	
Pr > z	0.847		0.895		0.540	
Sargan test of overid. restrictions	166.44		166.82		76.55	
Prob > χ^2	0.000		0.000		0.732	
Hansen test of overid	12.45		13.22		14.05	
Prob > χ^2	1.000		1.000		1.000	
Difference-in-Hansen tests	0.00					
Level Hansen test excluding group:	11.73		13.22			
Prob > χ^2	1.000		1.000			
Difference (null H = exogenous):	0.72		0.00			
Prob > χ^2	1.000		1.000			
Iv						
Hansen test excluding group:	12.45		13.83		14.05	
Prob > χ^2	1.000		1.000		1.000	
Difference (null H = exogenous):	0.00		-0.61		-0.00	
Prob > χ^2	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-10 One-step GMM estimation for hinterland with international trade

variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.2165***	3.61	0.2883***	4.19	0.0977	1.33
L_{t-1}	-0.0570	-0.37	-0.0927	-0.63	-0.0415	-0.41
H_{t-1}	0.0511	0.06	1.8607**	2.30	4.9765**	2.69
$(I/Y)_{t-1}$	0.0314**	2.38	-0.0189**	-2.20	0.0401	1.45
$(Trade/Y)_{t-1}$	0.0377***	3.05	0.0293**	2.53	-0.0006***	-0.04
C	- 2.1302***	-4.39				
No of overvation	170		170		136	
Number of instruments	139		138		116	
F-statistics	38.83		324.54		16.78	
Prob > F	0.000		0.000		0.000	
AR(1)	-3.12		-3.14		-2.95	
Pr > z	0.002		0.002		0.003	
for AR(2)	-0.49		-0.35		-0.59	
Pr > z	0.626		0.723		0.557	
Sargan test of overid. restrictions	199.42		198.98		121.28	
Prob > χ2	0.000		0.000		0.238	
Hansen test of overid	11.64		14.54		13.64	
Prob > χ2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	11.74		11.69			
Prob > χ2	1.000		1.000			
Difference (null H = exogenous):	-0.10		2.85			
Prob > χ2	1.000		1.000			
Iv						
Hansen test excluding group:	11.64		15.31		13.64	
Prob > χ2	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.00		-0.77		0.00	
Prob > χ2	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Table A7-11 One-step hinterland GMM with FDI and multinational Trade

variables	*System GMM*		*System GMM*		*Difference GMM*	
	Coefficient	t-Statics	Coefficient	t-Statics	Coefficient	t-Statics
$y_{0,\ t-1}$	0.3115***	4.79	0.3309***	4.37	0.1049*	1.82
L_{t-1}	-0.0157	-0.09	0.0328	0.20	0.0457	0.39
H_{t-1}	3.3380***	4.99	3.1674***	4.49	5.5700***	4.55
$(I_f/Y)_{t-1}$	-0.0170*	-2.10	-0.0098*	-1.90	0.0000	0.00
$(Trade_f/Y)_{t-1}$	-0.0030	-0.39	0.0005	0.05	-0.0021	-0.11
C	0.7394	1.42				
No of overvation	187		187		170	
Number of instruments	168		167		150	
F-statistics	48.37		235.78		28.94	
Prob > F	0.000		0.000		0.000	
AR(1)	-2.86		-2.82		-2.87	
Pr > z	0.004		0.005		0.004	
for AR(2)	1.39		1.39		1.05	
Pr > z	0.163		0.164		0.293	
Sargan test of overid. restrictions	187.83		179.74		161.11	
Prob > χ2	0.080		0.161		0.171	
Hansen test of overid	10.96		10.16		12.39	
Prob > χ2	1.000		1.000		1.000	
Difference-in-Hansen tests						
Level Hansen test excluding group:	10.96		10.16			
Prob > χ2	1.000		1.000			
Difference (null H = exogenous):	-0.00		0.00			
Prob > χ2	1.000		1.000			
Iv						
Hansen test excluding group:	10.96		10.16		12.39	
Prob > χ2	1.000		1.000		1.000	
Difference (null H = exogenous):	-0.00		0.00		0.00	
Prob > χ2	1.000		1.000		1.000	

Notes:*, **, *** denote significance at the 90, 95 and 99% confidence level

Bibliography

ADLER, M., 1974. The Cost of Capital and Valuation of a Two-Country Firm. *The Journal of Finance,* 29(1), pp. 119-132.

AGMON, T. and LESSARD, D.R., 1977. Investor Recognition of Corporate International Diversification. *The Journal of Finance,* 32(4), pp. 1049-1055.

AHN, S.C. and SCHMIDT, P., 1995. Efficient estimation of models for dynamic panel data. *Journal of Econometrics,* 68(1), pp. 5-27.

AITKEN, B. and HARRISON, A., 1999. Do domestic firms benefit from direct foreign investment? Evidence form Venezuela. *American Economic Review,* 89, pp. 605-618.

ALIBER, R.Z., 1970. a Theory of Direct Investment. In: C.P. KINDLEBERGER, ed, *The International Corporation.* pp. 17-34.

ALTSHULER, R. and GRUBERT, H., 2001. *Repatriation Taxes, Repatriation Strategies and Multinational Financial Policy.* National Bureau of Economic Research, Inc.

AMITI, M. and SMARZYNSKA JAVORCIK, B., 2008. Trade costs and location of foreign firms in China. *Journal of Development Economics*, 85(1-2), pp. 129-149.

ARELLANO, M., 2003. *panel data econometrics.* Oxford University Press.

ARELLANO, M. and BOND, S., 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies,* 58(2), pp. 277-297.

ARELLANO, M. and BOVER, O., 1995. Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics,* 68(1), pp. 29-51.

ARNDT, S.W., 1968. International Short Term Capital Movements: A Distributed Lag Model of Speculation in Foreign Exchange. *Econometrica*, 36(1), pp. 59-70.

AWOKUSE, T.O. and YIN, H., Intellectual property rights protection and the surge in FDI in China. *Journal of Comparative Economics*, In Press, Corrected Proof.

BALDASSARRI, M., ed, 1992. *Oligopoly and dynamic competition: firm, market and economic system.* Rome: Macmillan in association with Rivista di Politica Economica, SIPI.

BALTAGI, B.H., 2008. *Econometric Analysis of Panel Data.* 4 edn. John Wiley & Sons, Ltd.

BARRELL, R. and PAIN, N., 1999. Trade restraints and Japanese Direct Investment Flows *European Economic Review,* 43, pp. 29-45.

BARRELL, R. and PAIN, N., 1999. Trade restraints and Japanese direct investment flows. *European Economic Review,* 43(1), pp. 29-45.

BARRELL, R. and PAIN, N., 1997. Foreign Direct Investment, Technological Change, and Economic Growth within Europe. *Economic Journal,* 107(445), pp. 1770-86.

BARRELL, R. and PAIN, N., 1997. Foreign Direct Investment, Technological Change, and Economic Growth Within Europe. *The Economic Journal,* 107(445), pp. 1770-1786.

BARRELL, R. and PAIN, N., 1996. An Econometric Analysis of U.S. Foreign Direct Investment. *The review of economics and statistics,* 78(2), pp. 200-207.

BARTIK, T.J., 1985. Business Location Decisions in the United States: Estimates of the Effects of Unionization, Taxes, and Other Characteristics of States. *Journal of Business & Economic Statistics,*3(1), pp. 14-22.

BARTOV, E. and BODNAR, G.M., 1994. Firm Valuation, Earnings Expectations, and the Exchange-Rate Exposure Effect. *Journal of Finance,* 49(5), pp. 1755-85.

BARTOV, E., BODNAR, G.M. and KAUL, A., 1995. *Exchange Rate Variability and the Riskiness of U.S. Multinational Firms:Evidence from the Breakdown of the Bretton Woods System.* National Bureau of Economic Research, Inc.

BAUMOL, W.J., 1957. Speculation, Profitability, and Stability. *The review of economics and statistics,* 39(3), pp. 263-271.

BEKAERT, G. and HARVEY, C., 1997. Emerging equity market volatility. *Journal of Financial Economics,* (43), pp. 29-77.

BENEASSY- QUERE, A., FONTAGNE, L. and LAHRECHE-REVIL, A., 1999. *Exchange rate strategies in the competition for attracting FDI.* CEPII research center.

BIN, G., 2008. Technology acquisition channels and industry performance: An industry-level analysis of Chinese large- and medium-size manufacturing enterprises. *Research Policy,* 37(2), pp. 194-209.

BLAKE, A.P. and PAIN, N., *Investigating structural changes in UK export performance: the role of innovation and direct investment.* National Institute of Economic and Social Research.

BLOMSTRÖM, M. and LIPSEY, R.E., 1989. The export performance of US and Swedish Multinationals. *Review of Income and Wealth,* 35, pp. 245-264.

BLOMSTROM, M. and PERSSON, H., 1983. Foreign Investment and Spillover Efficiency in an Underdeveloped Economy: Evidence from the Mexican manufacturing industry. *World Development,* 11, pp. 493-501.

BLOMSTROM, M. and SJOHOLM, F., 1998. Technology Transfer and Spillovers, Does Local Participation with Multinationals Matter? *European Economic Review,* 43, pp. 915-923.

BLOMSTROM, M. and WANG, J., 1992. *Foreign Investment and Technology Transfer: A Simple Model.* National Bureau of Economic Research, Inc.

BLONIGEN, B.A. and PARK, J., 2004. Dynamic Pricing in the Presence of Antidumping Policy: Theory and Evidence. *American Economic Review,* 94(134), pp. 154.

BLONIGEN, B.A., 1997. Firm-Specific Assets and the Link between Exchange Rates and Foreign Direct Investment. *The American Economic Review,* 87(3), pp. 447-465.

BLUNDELL, R., BOND, S., DEVEREUX, M. and SCHIANTARELLI, F., 1992. Investment and Tobin's Q: Evidence from company panel data. *Journal of Econometrics,* 51(1-2), pp. 233-257.

BOARDMAN, H.G. and SUN, X., 1997. The Distribution of Foreign direct investment in China (POLICY RESEARCH WORKING PAPER).

BORENSZTEIN, E., DE GREGORIO, J. and LEE, J., 1998. How does foreign direct investment affect economic growth? *Journal of International Economics,* 45(1), pp. 115-135.

BOWN, C.P., 2007. Global Antidumping Database (Version 3.0). *Brandeis University working paper,* .

BOYAN JOVANOVIC and PETER L. ROUSSEAU, THE Q-THEORY OF MERGERS. *NATIONAL BUREAU OF ECONOMIC RESEARCH,Working Paper 8740,* .

BRADLEY, J. and FITZGERALD, J., 1988. Industrial output and factor input determination in an econometric model of a small open economy. *European Economic Review,* 32(6), pp. 1227-1241.

BRAINARD, S.L., 1997. An Empirical Assessment of The Proximity-Concentration Trade-Off between Multinational Sales and Trade. *American Economic Review,* 87, pp. 520-544.

BRAINARD, S.L., 1993. An Empirical Assessment of the Factor Proportions Explanation of Multi-National Sales. *National Bureau of Economic Research Working Paper Series,* No. 4583.

BRAINARD, S.L., 1993. A Simple Theory of Multinational Corporations and Trade with a Trade-Off Between Proximity and Concentration. *National Bureau of Economic Research Working Paper Series,* No. 4269.

BRANSTETTER, L.G. and FEENSTRA, R.C., 2002. Trade and foreign direct investment in China: a political economy approach. *Journal of International Economics,* 58(2), pp. 335-358.

BUCKLEY, P.J. and CASSON, M., 1981. The Optimal Timing of a Foreign Direct Investment. *The Economic Journal*, 91(361), pp. 75-87.

BUCKLEY, P.J. and HORN, S.A., 2009. Japanese Multinational Enterprises in China: Successful Adaptation of Marketing Strategies. *Long range planning,* 42(4), pp. 495-517.

CAMPA, J.M., 1993. Entry by Foreign Firms in the United States Under Exchange Rate Uncertainty. *The review of economics and statistics,* 75(4), pp. 614-622.

CANTWELL, J., 1995. The Globalisation of Technology: What Remains of the Product Cycle Model? *Cambridge Journal of Economics*, 19, pp. 155-174.

CARR, D.L., MARKUSEN, J.R. and MASKUS, K.E., 1998. *Estimating the Knowledge-Capital Model of the Multinational Enterprise.* National Bureau of Economic Research, Inc.

CARSTENSEN, K. and TOUBAL, F., 2004. Foreign direct investment in Central and Eastern European countries: a dynamic panel analysis. *Journal of Comparative Economics,* 32(1), pp. 3-22.

CAVES, R.E., 1974. Multinational Firms Competition and Productivity in Host-Country Markets. *Economica,* 41, pp. 176-193.

CAVES, R.E., 1971. International Corporations: The Industrial Economics of Foreign Investment. *Economica,* 38(149), pp. 1-27.

CEGLOWSKI, J. and GOLUB, S., 2007. Just How Low are China's Labour Costs?. *The World Economy,* 30(4), pp. 597-617.

CHAI, J.C.H., 1997. *China Transition to a Market Economy.* Clarendon Press. Oxford.

CHEN, C., 1996. Regional determinants of foreign direct investment in mainland China. *Journal of Economic Studies,* 23(2),.

CHEN, H. and HU, M.Y., 2002. An analysis of determinants of entry mode and its impact on performance. *International Business Review,* 11(2), pp. 193-210.

CHEN, J. and FLEISHER, B.M., 1996. Regional Income Inequality and Economic Growth in China. *Journal of Comparative Economics,* 22(2), pp. 141-164.

CHEN, Y., YANG, C., HSU, S. and WANG, Y., 2009. Entry mode choice in China's regional distribution markets: Institution vs. transaction costs perspectives. *Industrial Marketing Management,* 38(7), pp. 702-713.

CHENG, L.K. and KWAN, Y.K., 2000. What are the determinants of the location of foreign direct investment? The Chinese experience. *Journal of International Economics,* 51(2), pp. 379-400.

CHENG, L.K. and KWAN, Y.K., 2000. What are the determinants of the location of foreign direct investment? The Chinese experience. *Journal of International Economics,* 51(2), pp. 379-400.

CHEUNG, K. and LIN, P., 2004. Spillover effects of FDI on innovation in China: Evidence from the provincial data. *China Economic Review,* 15(1), pp. 25-44.

CHOU, W.L., 2000. Exchange Rate Variability and China's Exports. *Journal of Comparative Economics,* 28(1), pp. 61-79.

CHRISTMANN, P. and TAYLOR, G., 2001. Globalization and the Environment: Determinants of Firm Self-Regulation in China. *Journal of International Business Studies*, 32(3), pp. 439-458.

CHU, T. and PRUSA, T.J., 2004. *The Reasons for and the Impact of Antidumping Protection: The Case of People's Republic of China.*

COHEN, B.I., 1973. Comparative Behavior of Foreign and Domestic Export Firms in a Developing Economy. *The review of economics and statistics,* 55(2), pp. 190-97.

COUGHLIN, C.C. and SEGEV, E., 1999. *Foreign direct investment in China: a spatial econometric study.* Federal Reserve Bank of St. Louis.

COUGHLIN, C.C., TERZA, J.V. and ARROMDEE, V., 1991. State Characteristics and the Location of Foreign Direct Investment within the United States. *The review of economics and statistics,* 73(4), pp. 675-683.

CUMMINS, J.G., HASSETT, K.A. and GLENN, R., 1996. *Tax Reforms and Investment: A Cross-Country Comparison.* National Bureau of Economic Research, Inc.

CUSHMAN, D.O., 1988. Exchange-rate uncertainty and foreign direct investment in the United States. *Review of World Economics,* 124(Jun), pp. 322-336.

CUSHMAN, D.O., 1986/9. Has exchange risk depressed international trade? The impact of third-country exchange risk. *Journal of International Money and Finance,* 5(3), pp. 361-379.

CUSHMAN, D.O., 1985. Real Exchange Rate Risk, Expectations, and the Level of Direct Investment. *The review of economics and statistics,* 67(2), pp. 297-308.

CUSHMAN, D.O., 1983. The effects of real exchange rate risk on international trade. *Journal of International Economics,* 15(1-2), pp. 45-63.

DAS, S., 1987. Externalities, and technology transfer through multinational corporations A theoretical analysis. *Journal of International Economics,* 22(1-2), pp. 171-182.

DE MOOIJ, R.A. and EDERVEEN, S., 2003. Taxation and Foreign Direct Investment: A Synthesis of Empirical Research. *International Tax and Public Finance,* 10(6), pp. 673-93.

DEAN, J.M., LOVELY, M.E. and WANG, H., 2009. Are foreign investors attracted to weak environmental regulations? Evaluating the evidence from China. *Journal of Development Economics,* 90(1), pp. 1-13.

DEES, S., 1998. Foreign Direct Investment in China: Determinants and Effects. *Economics of Planning,* 31(2), pp. 175-194.

DESAI, P., DÍAZ ALEJANDRO, C.F., BHAGWATI, J.N., HORST, T. and ROWTHORN, R., 1977. The international operations of national firms: A study of direct foreign investment : Stephen H. Hymer, (M.I.T. Press, Cambridge, MA, 1976) pp. xxii + 253, $12.50. *Journal of Development Economics,* 4(4), pp. 387-400.

DEVEREUX, M.P. and GRIFFITH, R., 1998. Taxes and the location of production: evidence from a panel of US multinationals. *Journal of Public Economics,* 68(3), pp. 335-367.

DEVEREUX, M.P., LOCKWOOD, B. and REDOANO, M., 2002. *Do Countries Compete over Corporate Tax Rates?* C.E.P.R. Discussion Papers.

DEVEREUX, M., GRIFFITH, R. and SIMPSON, H., 2004. *Agglomeration, regional grants and firm location.* Institute for Fiscal Studies.

DEWENTER, K.L., 1995. Do Exchange Rate Changes Drive Foreign Direct Investment? *The Journal of Business,* 68(3), pp. 405-433.

DIMITROIS ASTERIOU and STEPHEN G.HALL, 2007. Applied Econometrics.

DIXIT, A., 1980. The Role of Investment in Entry-Deterrence. *Economic Journal*, 90(357), pp. 95-106.

DU, J., LU, Y. and TAO, Z., 2008. Economic institutions and FDI location choice: Evidence from US multinationals in China. *Journal of Comparative Economics,* 36(3), pp. 412-429.

DUMAS, B., 1978. The Theory of the Trading Firm Revisited. *Journal of Finance,* 33(3), pp. 1019-30.

DUNNING, J.H., 1988. *Explaining International production.* London: Unwin Hyman.

DUNNING, J.H., 1988. *Multinationals, Technology and competitiveness.* London: Unwin Hyman.

DUNNING, J.H., 1982. Explaining the International Direct Investment Position of Countries: Towards a Dynamic or Developmental Approach, J. BLACK and J.H. DUNNING, eds. In: *International Capital Movements* 1982, pp. 84-121.

DUNNING, J.H., 1979. Explaining Changing Patterns of International Production: In Defence of the Eclectic Theory. *Oxford Bulletin of Economics and Statistics,* 41(4), pp. 269-95.

DUNNING, J.H., ed, 1973. *Economic Analysis and the Multinational Enterprise.* London George Allen& Unwin Ltd.

EDWARDS, S., 1988/11. Real and monetary determinants of real exchange rate behavior: Theory and evidence from developing countries. *Journal of Development Economics,* 29(3), pp. 311-341.

ENDERS, W., 2010. *Applied Econometric Time Series.* Wiley.

ETHIER, W.J., 1986. The Multinational Firm. *The Quarterly Journal of Economics,* 101(4), pp. 805-33.

ETHIER, W.J. and MARKUSEN, J.R., 1996. Multinational Firms, Technology Diffusion and Trade. *Journal of International Economics,* 41, pp. 1-28.

FAGERBERG, J., 1988. International Competitiveness. *Economic Journal,* 98, pp. 355-374.

FAMA, E.F. and LAFFER, A.B., 1972. The Number of Firms and Competition. *The American Economic Review,* 62(4), pp. 670-674.

FAN, X.Y. and YUAN, Z.G., An exploration of the theory and empirics of investment efficiency at Macroeconomic Level. (working paper).

FAZZARI, S., HUBBARD, R.G. and PETERSEN, B., 1988. Investment, Financing Decisions, and Tax Policy. *The American Economic Review,* 78(2, Papers and

Proceedings of the One-Hundredth Annual Meeting of the American Economic Association), pp. 200-205.

FELDSTEIN, M.S., 1969. Mean-Variance Analysis in the Theory of Liquidity Preference and Portfolio Selection. *The Review of Economic Studies,* 36(1), pp. 5-12.

FETSCHERIN, M., VOSS, H. and GUGLER, P., 30 Years of foreign direct investment to China: An interdisciplinary literature review. *International Business Review,* In Press, Corrected Proof.

FINDLAY, R., 1978. Relative Backwardness, Direct Foreign Investment and the Transfer of Technology: a Simple Dynamic Model. *Quarterly Journal of Economics,* 92, pp. 1-16.

FINDLAY, R., 1974. Relative Prices, Growth and Trade in a Simple Ricardian System. *Economica,* 41(161), pp. 1-13.

FLAM, H. and HELPMAN, E., 1987. Vertical Product Differentiation and North-South Trade. *The American Economic Review,* 77(5), pp. 810-822.

FLOYD, J.E., 1969. International Capital Movements and Monetary Equilibrium. *The American Economic Review,* 59(4, Part 1), pp. 472-492.

FROOT, K.A. and STEIN, J.C., 1991. Exchange Rates and Foreign Direct Investment: An Imperfect Capital Markets Approach. *The Quarterly Journal of Economics,* 106(4), pp. 1191-217.

FUNG, K.C., IIZAKA, H. and PARKER.S, 2000. Determinants of U.S. and Japanese Direct Investment in China. *Association for Comparative Economic Studies,* .

FUNG, K.C., IIZAKA, H. and SIU, A., 2003. Japanese direct investment in China. *China Economic Review,* 14(3), pp. 304-315.

FUNKE, M. and RAHN, J., 2002. Just How Undervalued is the Chinese Renminbi. *The World Economy,* 28(4), pp. 465-489.

GASTANAGA, V.M., NUGENT, J.B. and PASHAMOVA, B., 1998/7. Host country reforms and FDI inflows: How much difference do they make? *World Development,* 26(7), pp. 1299-1314.

GEROSKI, P.A., 1982. Simultaneous Equations Models of the Structure-Performance Paradigm. *European Economic Review,* 19, pp. 145-158.

GILMAN, M.G., 1981. *The Financing of Foreign Direct Investment.* Frances Printer(publisher) Ltd., London.

GLASS, A.J. and SAGGI, K., 1998. International technology transfer and the technology gap. *Journal of Development Economics,* 55(2), pp. 369-398.

GLOBERMAN, S., 1979. Foreign Direct Investment and ‘Spillover’ Efficiency Benefits in Canadian manufacturing industries. *Canadian Journal of Economics,* 12, pp. 42-56.

GOLDBERG, L.S. and KLEIN, M.W., 1997. Foreign Direct Investment, Trade and Real Exchange Rate Linkages in Southeast Asia and Latin America. *NBER Working Paper No. W6344,* .

GOLDBERG, M.A. and LEE, W.Y., 1977. The Cost of Capital and Valuation of a Two-Country Firm: Comment. *The Journal of Finance,* 32(4), pp. 1348-1353.

GOLDSTEIN, M. and LARDY, N., 2006. China's Exchange Rate Policy dilemma. *American Economic Review,* 96(2), pp. 422-426.

GORG, H. and GREENAWAY, D., 2004. Much Ado about Nothing? Do domestic firms really benefit from foreign direct investment? *The world bank research observer,* 19(2),.

GRAHAM, E.M., 1978. Transatlantic investment by Multinational Firms: a rivalistic phenomenon? *Journal of Post Keynesian Economics,* Autumn.

GRAHAM, E.M. and WADA, E., 2001. FOREIGN DIRECT INVESTMENT IN CHINA: Effects on Growth and Economic Performance. *working paper,* .

GRAY H. PETER, 1982. Towards a Unified Theory of International Trade, International Production and Foreign Direct Investment, J. BLACK and J.H. DUNNING, eds. In: *International Capital Movements*1982, pp. 58-83.

GRUBEL, H.G., 1968. Internationally Diversified Portfolios: Welfare Gains and Capital Flows. *The American Economic Review,* 58(5), pp. 1299-1314.

GRUBERT, H. and MUTTI, J., 1991. Taxes, Tariffs and Transfer Pricing in Multinational Corporate Decision Making. *The review of economics and statistics,* 73(2), pp. 285-93.

GUNTER, F.R., 1996. Capital flight from the People's Republic of China: 1984–1994. *China Economic Review,* 7(1), pp. 77-96.

HADDAD, M. and HARRISON, A., 1993. Are there Positive Spillovers from Direct Foreign Investment? Evidence from panel data for Morocco. *Journal of Development Economics,* 42, pp. 51-74.

HARFORD, J., 2005. What drives merger waves? *Journal of Financial Economics,* 77(3), pp. 529-560.

HARRIS, R., 1995. *Cointegration Analysis in Econometric Modelling.* Prentice Hall.

HARRISON, A.E., LOVE, I. and MCMILLAN, M.S., 2004. Global capital flows and financing constraints. *Journal of Development Economics,* 75(1), pp. 269-301.

HARTMAN, D.G., 1979. Foreign Investment and Finance with Risk. *The Quarterly Journal of Economics*, 93(2), pp. 213-232.

HEAD, C.K., RIES, J.C. and SWENSON, D.L., 1999. Attracting foreign manufacturing: Investment promotion and agglomeration. *Regional Science and Urban Economics,* 29(2), pp. 197-218.

HEAD, K. and RIES, J., 1996. Inter-City Competition for Foreign Investment: Static and Dynamic Effects of China's Incentive Areas. *Journal of Urban Economics,* 40(1), pp. 38-60.

HEAD, K., RIES, J. and SWENSON, D., 1995. Agglomeration benefits and location choice: Evidence from Japanese manufacturing investments in the United States. *Journal of International Economics,*38(3-4), pp. 223-247.

HELPMAN, E., 1984. A Simple Theory of International Trade with Multinational Corporations. *The Journal of Political Economy,* 92(3), pp. 451-471.

HELPMAN, E., 1981. International trade in the presence of product differentiation, economies of scale and monopolistic competition : A Chamberlin-Heckscher-Ohlin approach. *Journal of International Economics,* 11(3), pp. 305-340.

HELPMAN, E. and KRUGMAN, P., 1985. *Market structure and foreign trade: increasing returns, imperfect competition, and the international economy.* Cambridge (Mass), MIT Press.

HINES, J.R.,JR and RICE, E.M., 1994. Fiscal Paradise: Foreign Tax Havens and American Business. *The Quarterly Journal of Economics*, 109(1), pp. 149-82.

HONG, M. and CHEN, L., 2001. Quantitative and Dynamic Analysis of the OLI Variables Determining FDI in China. *Review of Urban and Development Studies,* 13(2), pp. 163-172.

HORSTMANN, I.J. and MARKUSEN, J.R., 1987. Strategic Investments and the Development of Multinationals. *International Economic Review,* 28(1), pp. 109-121.

HORSTMANN, I. and MARKUSEN, J.R., 1987. Licensing versus Direct Investment: A Model of Internalization by the Multinational Enterprise. *The Canadian Journal of Economics / Revue canadienne d'Economique,* 20(3), pp. 464-481.

HSIAO, C., 2003. *Analysis of panel data.* Cambridge : Cambridge University Press.

HU, A.G.Z. and JEFFERSON, G.H., 2002. FDI Impact and Spillover: Evidence from China`s Electronic and Textile Industries. *The World Economy,* 25, pp. 1063-1076.

HUANG, C. and SHARIF, N., 2009. Manufacturing dynamics and spillovers: The case of Guangdong Province and Hong Kong, Macau, and Taiwan (HKMT). *Research Policy,* 38(5), pp. 813-828.

HYMER, S.H., 1976. The International Operations of National Firms: A Study of Direct Foreign Investment.

IMF, 1992. Balance of Payments Manual, 5th Edition.

ITAGAKI, T., 1981. The Theory of the Multinational Firm under Exchange Rate Uncertainty. *The Canadian Journal of Economics / Revue canadienne d'Economique,* 14(2), pp. 276-297.

JOHANSEN, S., 2002. A small sample correction for tests of hypotheses on the cointegrating vectors. *Journal of Econometrics,* 111(2), pp. 195-221.

JOHANSEN, S., 1992. Testing weak exogeneity and the order of cointegration in UK money demand data. *Journal of Policy Modeling,* 14(3), pp. 313-334.

JOHANSEN, S. and SCHAUMBURG, E., 1999. Likelihood analysis of seasonal cointegration. *Journal of Econometrics,* 88(2), pp. 301-339.

JOHNSON HARRY G., 1970. The Efficiency and Welfare Implications of the International Corporation, KINDLEBERGER CHARLES P., ed. In: *The International Corporation* 1970, pp. 35-56.

KELLER, W., 1996. Absorptive capacity: On the creation and acquisition of technology in development. *Journal of Development Economics,* 49(1), pp. 199-227.

KINDLEBERGER, C.P., ed, 1970. *The international corporation: a symposium.* M.I.T. Press.

KINDLEBERGER, C.P., 1969. *American business abroade: six lectures on direct investment.* Yale U.P.

KLEIN, M.W. and ROSENGREN, E., 1994. The real exchange rate and foreign direct investment in the United States : Relative wealth vs. relative wage effects. *Journal of International Economics,* 36(3-4), pp. 373-389.

KOKKO, A., 1996. Productivity Spillovers from Competition between Local Firms and Foreign Affiliates. *Journal of International Development,* 8, pp. 517-530.

KOKKO, A., 1994. Technology, Market Characteristics, and Spillovers. *Journal of Development Economics,* 43, pp. 279-293.

KOKKO, A., TANSINI, R. and ZEJAN, M.C., 1996. Local Technological Capability and Productivity Spillover from FDI in the Uruguayan manufacturing sector. *Journal of Development Studies,* 32, pp. 602-611.

KOKKO, A., 1994. Technology, market characteristics, and spillovers. *Journal of Development Economics,* 43(2), pp. 279-293.

KOOP, G., 2009. *Analysis of Econometric Data.* Wiley edn.

KOURI, P.J.K. and PORTER, M.G., 1974. International Capital Flows and Portfolio Equilibrium. *The Journal of Political Economy,* 82(3), pp. 443-467.

KRUGMAN, P., 1991. Increasing Returns and Economic Geography. *The Journal of Political Economy,* 99(3), pp. 483-499.

KRUGMAN, P., 1980. Scale Economies, Product Differentiation, and the Pattern of Trade. *The American Economic Review,* 70(5), pp. 950-959.

KWIATKOWSKI, D., PHILLIPS, P.C.B., SCHMIDT, P. and SHIN, Y., 1992. Testing the Null Hypothesis of Stationarity against the Alternative of a Unit Root. *Journal of Econometrics,* , pp. 159-178.

LADENSON, M.L., 1972. A Dynamic Balance Sheet Approach to American Direct Foreign Investment. *International Economic Review,* 13(3), pp. 531-543.

LAI, M., WANG, H. and ZHU, S., 2009. Double-edged effects of the technology gap and technology spillovers: Evidence from the Chinese industrial sector. *China Economic Review,* 20(3), pp. 414-424.

LARDY, N., 1994. *China in the World Economy.* Institute for international Economics.

LARDY, N., *Integrating China into the Global Economy.*

LEIBENSTEIN, H., 1966. Allocative efficiency vs. X-efficiency. *American Economic Review,* 56, pp. 392-415.

LI, X., LIU, X. and PARKER, D., 2001. Foreign direct investment and productivity spillovers in the Chinese manufacturing sector. *economic systems,* 25(4), pp. 305-321.

LIN, P., 2001. *R & D in China and the Implications for Industrial Restructuring at the Dawn of China's Accession to the WTO.* East Asian Bureau of Economic Research.

LIN, P., LIU, Z. and ZHANG, Y., 2009. Do Chinese domestic firms benefit from FDI inflow?: Evidence of horizontal and vertical spillovers. *China Economic Review,* 20(4), pp. 677-691.

LINDSEY, B. and IKENSON, D., 2002. Antidumping 101: The Devilish Details of " Unfair Trade" Law. *CATO Institute center for Trade Policy Studies working paper No.20,* .

LIPSEY, R.E., 1999. The location and characteristics of U.S. affliliates in Asia. *NBER working paper No.6876,* .

LIPSEY, R.E. and SJOHOLM, F., 2001. *Foreign Direct Investment and Wages in Indonesian Manufacturing.* National Bureau of Economic Research, Inc.

LIPSEY, R.E. and WEISS, M.Y., 1984. Foreign Production and Exports of Individual Firms. *The review of economics and statistics,* 66(2), pp. 304-308.

LIPSEY, R.E. and WEISS, M.Y., 1981. Foreign Production and Exports in Manufacturing Industries. *The review of economics and statistics,* 63(4), pp. 488-494.

LIU, C., 2009. Financial Crisis and FDI's Interest in China's hinterland: A Quest for Social Infrastructure Factors . *working paper,* .

LIU, X., SILER, P., WANG, C. and WEI, Y., 2000. Productivity spillovers from foreign direct investment: evidence from UK industry level panel data. *Journal of International Business Studies,* 31, pp. 407-425.

LIU, X., WANG, C. and WEI, Y., 2001. Causal links between foreign direct investment and trade in China. *China Economic Review,* 12, pp. 190-202.

LIU, X., SILER, P., WANG, C. and WEI, Y., 2000. Productivity Spillovers from Foreign Direct Investment: Evidence from UK Industry Level Panel Data. *Journal of International Business Studies,* 31(3), pp. 407-425.

LIU, X., SONG, H., WEI, Y. and ROMILLY, P., 1997. Country characteristics and foreign direct investment in China: A panel data analysis. *Review of World Economics,* 133(2), pp. 313-329.

LIU, X., WANG, C. and WEI, Y., 2001. causal linkds between foreign direct investment and trade in China. *China Economic Review,* 12, pp. 190-202.

LIU, Z., 2008. Foreign direct investment and technology spillovers: Theory and evidence. *Journal of Development Economics,* 85(1-2), pp. 176-193.

LIU, Z., 2002. Foreign Direct Investment and Technology Spillover: Evidence from China. *Journal of Comparative Economics,* 30(3), pp. 579-602.

LO, D., 1999. Reappraising the performance of China's state-owned industrial enterprises 1980–1996. *Cambridge Journal of Economics,* 23, pp. 693-718.

LOVE, I., Fall 2003. Financial development and Financing constraints: international Evidence from the structural Investment Model. *the review of financial studies,* 16(3), pp. 765-791.

MA, X. and DELIOS, A., 2007. A new tale of two cities: Japanese FDIs in Shanghai and Beijing, 1979–2003. *International Business Review,* 16(2), pp. 207-228.

MADDALA, G.S. and KIM, I., 2004. Unit Roots, Cointegration, and Structural Change.

MARKUSEN, J.R., 1997. Trade Versus Investment Liberalization. *NBER working paper 6231,* .

MARKUSEN, J.R., 1995. The Boundaries of Multinational Enterprises and the Theory of International Trade. *The Journal of Economic Perspectives,* 9(2), pp. 169-189.

MARKUSEN, J.R., 1984. Multinationals, multi-plant economies, and the gains from trade. *Journal of International Economics,* 16(3-4), pp. 205-226.

MARKUSEN, J.R. and VENABLES, A.J., 1996. The Increased Importance of Direct Investment in North Atlantic Economic Relationships: A convergence Hypothesis, Ethier, W. J and Grilli, V. (eds). *The New Transalantic Economy,* .

MARKUSEN, J.R. and VENABLES, A.J., 1999. Foreign direct investment as a catalyst for industrial development. *European Economic Review,* 43(2), pp. 335-356.

MARKUSEN, J.R. and VENABLES, A.J., 1998. Multinational firms and the new trade theory. *Journal of International Economics*, 46(2), pp. 183-203.

MASTEL, G., 1998. *Antidumping Laws and the U.S. Economy.* M.E. Sharpe.

MCKINNON, R., 2006. China's Exchange Rate Policy Trap: Japan Redux? *American Economic Review*, 96(2), pp. 427-431.

MODY, A. and SRINIVASAN, K., 1998. Japanese and United States Firms as Foreign Investors: Do they march to the same tune? *Canadian Journal of Economics,* 31(4), pp. 778-799.

MUNDELL, R.A., 1960. The Monetary Dynamics of International Adjustment under Fixed and Flexible Exchange Rates. *The Quarterly Journal of Economics,* 74(2), pp. 227-257.

MUNDELL, R.A., 1957. International Trade and Factor Mobility. *American Economic Review,* 47, pp. 321-335.

NAUMANN-ETIENNE, R., 1974. A Framework for Financial Decisions in Multinational Corporations--Summary of Recent Research. *The Journal of Financial and Quantitative Analysis,* 9(5, 1974 Proceedings), pp. 859-874.

O' SULLIVAN, P.J., 1993. An assessment of Ireland's Export-led Growth Strategy via Foreign Direct Investment: 1960-80. *Weltwirtschaftliches Archiv,* 129.

OECD, 2000. Main Determinants and Impacts of foreign direct investment on China's Economy. *WORKING PAPERS ON INTERNATIONAL INVESTMENT,* .

OECD, 1999. OECD Detailed Benchmark Definition of Foreign Direct Investment.

OHLIN, B., 1977. Some aspects of the relations between International Movements of Commodities, Factors of Production, and Technology, B. OHLIN, P. HESSELBORN and P.M. WIJKMAN, eds. In: *The International Allocation of Economic activity* 1977, pp. 25-56.

ONIDA, F., 1992. Multinational Firms, International Competition and Oligopolistic Rivalry: Theoretical Trends. see in Baldassarri.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT, 1996. OECD Benchmark Definition of Foreign direct Investment, 3rd edition.

PAIN, N. and WAKELIN, K., 1997. Export performance and the role of foreign direct investment. *working paper,* (38), pp. 339-351.

PAIN, N., 1993. An Econometric Analysis of Foreign Direct Investment in the United Kindom. *Scottish Journal of Political Economy,* 40.

PAIN, N., 1993. Financial Liberalization and Foreign Portfolio Investment in the United Kingdom. *Oxford Economic Papers,* 45(1), pp. 83-102.

PAN, Y., 2003. The inflow of foreign direct investment to China: the impact of country-specific factors. *Journal of Business Research,* 56(10), pp. 829-833.

PAN, Y., 2002. Equity Ownership in International Joint Ventures: The Impact of Source Country Factors. *Journal of International Business Studies,* 33(2), pp. 375-384.

PAN, Y., 1996. Influences on Foreign Equity Ownership Level in Joint Ventures in China. *Journal of International Business Studies,* 27(1), pp. 1-26.

PAN, Y. and CHI, P.S.K., 1999. Financial Performance and Survival of Multinational Corporations in China. *Strategic Management Journal,* 20(4), pp. 359-374.

PENG, M.W., LU, Y., SHENKAR, O. and WANG, D.Y.L., 2001. Treasures in the China house: a review of management and organizational research on Greater China. *Journal of Business Research,* 52(2), pp. 95-110.

PEREZ, T., 1997. Multinational enterprises and technological spillovers: an evolutionary model. *Journal of Evolutionary Economics,* 7, pp. 169-192.

PESARAN, M.H. and PESARAN, B., 1997. *Working with Microfit 4: Microfit 4 User Manual.* Oxford University Press.

PESARAN, M.H., SHIN, Y. and SMITH, R.J., 2001. Bounds Testing Approaches to analysis of level relationships. *Journal of Applied Econometrics,* , pp. 289-326.

PETER C. B. PHILLIPS and PIERRE PERRON, 1988. Testing for a Unit Root in Time Series Regression. *Biometrika,* 75, pp. 335-346.

PFAFFERMAYR, M., 1996. Foreign Outward Direct Investment and Exports in Austrian Manufacturing: Substitutes or Complements? *Weltwirtschaftliches Archiv,* 132.

PFAFFERMAYR, M., 1994. Foreign Direct Investment and Exports: A Time Series Approach. *Applied Economics,* 26(4), pp. 337-51.

POMFRET, R., 1997. Growth and Transition: Why Has China's Performance Been So Different? *Journal of Comparative Economics,* 25(3), pp. 422-440.

PORTER M.E., 1986. Changing Patterns of International Competition. *California Management Review,* Winter.

PORTER, N. and XU, T., 2009. What Drives China's Interbank Market? *IMF Working Paper, .*

PRUSA, T.J., 2006. East Asia's anti-dumping problem. *World Economy,* 29(6), pp. 743-761.

PRUSA, T.J., 2001. On the Spread and Impact of Antidumping. *Canadian Journal of Economics,* 34(3), pp. 591-611.

QIAO LIU, 2006. Corporate Governance in China: Current Practices, Economic Effects and Institutional Determinants. *CESifo Economic Studies, Vol. 52, 2/2006, 415–453, doi:10.1093/cesifo/ifl001, .*

RHOMBERG, R.R., 1964. A Model of the Canadian Economy Under Fixed and Fluctuating Exchange Rates. *The Journal of Political Economy,* 72(1), pp. 1-31.

RODRÍGUEZ-CLARE, A., 1996. Multinationals, Linkages, and Economic Development. *The American Economic Review,* 86(4), pp. 852-873.

ROODMAN, D., December 2006. How to do xtabond2: an introduction to "difference" and "system" GMM in Stata. (working paper 103),.

ROSSI, S. and VOLPIN, P.F., 2004. Cross-country determinants of mergers and acquisitions. *Journal of Financial Economics,* 74(2), pp. 277-304.

RUGMAN, A.M., Spring 1980. a New Theory of the Multinational Enterprise: Internationalization Versus Internalization. *Columbia Journal of World Business,* XV(1), pp. 23-29.

SALA-I-MARTIN, X.X., 1996. The Classical Approach to Convergence Analysis. *The Economic Journal,* 106(437), pp. 1019-1036.

SAMUELSON, P., 1948. International Trade and Equalisation of Factor Prices. *Economic Journal,* 58.

SHAPIRO, A.C., 1978. Financial Structure and Cost of Capital in the Multinational Corporation. *The Journal of Financial and Quantitative Analysis,* 13(2), pp. 211-226.

SHAPIRO, A.C., 1975. Exchange Rate Changes, Inflation, and the Value of the Multinational Corporation. *Journal of Finance,* 30(2), pp. 485-502.

SICULAR, T., 1998. Capital Flight and Foreign Investment: Two Tales from China and Russia. *UWO Department of Economics Working Papers with number 9803,* .

SMITH A., 1987. Strategic Investment, Multinational Cororations and Trade Policy. *European Economic Review,* February-March.

STEIN, J.L., 1965. International Short-Term Capital Movements. *The American Economic Review,* 55(1/2), pp. 40-66.

STEVEN, G.V.G., 1972. Capital Mobility and the International Firm. In: FRITZ MACHLUP, WALTER S. SALANT, AND LORIE TARSHIS, ed, *International Mobility and Movement of Capital.* pp. 323-366.

STIGLITZ, J.E., 1969. A Re-Examination of the Modigliani-Miller Theorem. *The American Economic Review,* 59(5), pp. 784-793.

SUN, H., Macroeconomics impact of direct foreign investment in China:1979-96. *The World Economy,* (21), pp. 675-694.

SUN, Q., TONG, W. and YU, Q., 2002. Determinants of foreign direct investment across China. *Journal of International Money and Finance,* 21(1), pp. 79-113.

SVENSSON, R., 1996. Effects of Overseas Production on home country ecports: Evidence based on Swedish multinationals. *Weltwirtschaftliches Archiv,* 132, pp. 304-329.

TEECE, D.J., Technological and organizational factors in the theory of the multinational enterprise, *The Growth of International Business. Allen and Unwin, London.,* .

TEECE, D.J., 1986. Transactions cost economics and the multinational enterprise An Assessment. *Journal of Economic Behavior & Organization,* 7(1), pp. 21-45.

TOBIN, J., 1969. A General Equilibrium Approach To Monetary Theory. *Journal of Money, Credit and Banking,* 1(1), pp. 15-29.

TODO, Y., ZHANG, W. and ZHOU, L., 2009. Knowledge spillovers from FDI in China: The role of educated labor in multinational enterprises. *Journal of Asian Economics,* 20(6), pp. 626-639.

VANDENBUSSCHE, H., KONINGS, J. and SPRINGAE, L.L., 1999. Import Diversion under European Antidumping Policy. *CEPR Discussion Paper No. 2785,* .

VERNON, R., 1979. The Product Cycle Hypothesis in a New International Environment. *Oxford Bulletin of Economics and Statistics*, 41(4), pp. 255-67.

VERNON, R., 1966. International Investment and International Trade in the Product Cycle. *The Quarterly Journal of Economics,* 80(2), pp. 190-207.

WALTER STEINGRESS and HYLKE VANDENBUSSCHE, January 30, 2008. Foreign Direct Investment, Financial constraints and growth in China.

WANG, J., 1999. a critique of the application to China of the non market economy rules of antidumping legislation and practice of the European Union. *Journal of World Trade*, 33(3), pp. 117-146.

WANG, J. and BLOMSTROM, M., 1992. Foreign investment and technology transfer: a simple model. *European Economic Review,* 36, pp. 137-155.

WEI, Y. AND LIU, X., 2001. Foreign Direct investment and trade interactions in China. In: WEI, Y. AND LIU, X., ed, *Foreign Direct Investment in China.* Edward Elgar, pp. 133-154.

WEI, Y. AND LIU, X., 2001. Foreign Direct Investment in China: Determinants and Impact. *Edward Elgar, UK,* .

WEI, Y., LIU, X., SONG, S. and AND ROMILLY, P., 2001. Endogenous Innovation Growth Theory and Regional Income Convergence in China. *Journal of International Development*, 13(2), pp. 153-168.

WEI, Y. and LIU, X., 2001. The Regional Distribution of Foreign Direct Investement in China. *Foreign Direct Investment in China.* pp. 63-90.

WEI, S., 1995. Attracting foreign direct investment: Has China reached its potential? *China Economic Review,* 6(2), pp. 187-199.

WEI, S., 1995. Attracting foreign direct investment: Has China reached its potential? *China Economic Review,* 6(2), pp. 187-199.

WEI, S. and FRANKEL, J., 1994. A “Greater China” trade Bloc? *China Economic Review,* 5(2), pp. 179-190.

WEI, S. and FRANKEL, J., 1994. A “Greater China” trade Bloc? *China Economic Review,* 5(2), pp. 179-190.

WEI, Y., LIU, B. and LIU, X., 2005. Entry modes of foreign direct investment in China: a multinomial logit approach. *Journal of Business Research,* 58(11), pp. 1495-1505.

WEISS, J., 2007. Investiment Climate in China: province estimates. February.

WHEELER, D. and MODY, A., 1992. International investment location decisions : The case of U.S. firms. *Journal of International Economics,* 33(1), pp. 57-76.

WILLETT, T.D., 1967. International Short-Term Capital Movements: Comments. *The American Economic Review,* 57(3), pp. 548-565.

WILLETT, T.D. and FORTE, F., 1969. Interest Rate Policy and External Balance. *The Quarterly Journal of Economics,* 83(2), pp. 242-262.

WOOLDRIDGE, J.M., 2002. *Econometric analysis of cross section and panel data.* Cambridge, Mass. : MIT Press.

WU, X. and STRANGE, R., 2000. The location of foreign insurance companies in China. *International Business Review,* 9(3), pp. 383-398.

XING, Y., 2006. Why is China so attractive for FDI? The role of exchange rates. *China Economic Review,* 17(2), pp. 198-209.

XING, Y. and ZHAO, L., 2008. Reverse imports, foreign direct investment and exchange rates. *Japan and the World Economy,* 20(2), pp. 275-289.

YAO, S., 2006. On economic growth, FDI and exports in China. *Applied Economics,* 38(3), pp. 339-351.

YASUHIRO ARIKAWA and HIDEAKI MIYAJIMA, 2007. Understanding the M&A boom in Japan:What drives Japanese M&A? *RIETI Discussion Paper Series 07-E-042,* .

ZHANG, K.H., 2001. China's inward FDI boom and the greater Chinese economy. *Chinese Economy,* 34(1), pp. 74-88.

ZHANG, K.H., 2001. What explains the boom of foreign direct investment in China? *Economia Internazionale,* 54(2), pp. 251-274.

ZHANG, K.H., 2000. Why is U.S. Direct Investment in China so Small. *Contemporary Economic Policy,* 18(1), pp. 82-94.

ZHANG, Z., 2001. Real Exchange Rate Mislignment in China: An Empirical Investigation. *Journal of Comparative Econimics,* 29, pp. 8-94.

ZHANG, A., ZHANG, Y. and ZHAO, R., 2003. A study of the R&D efficiency and productivity of Chinese firms. *Journal of Comparative Economics,* 31(3), pp. 444-464.

ZHANG, A., ZHANG, Y. and ZHAO, R., 2001. Impact of Ownership and Competition on the Productivity of Chinese Enterprises. *Journal of Comparative Economics,* 29(2), pp. 327-346.

ZHANG, K.H., 2000. Why Is U.S. Direct Investment in China So Small? *Contemporary Economic Policy,* 18(1), pp. 82-94.

ZHANG, K.H. and MARKUSEN, J.R., 1997. *Vertical Multinationals and Host-Country Characteristics.* National Bureau of Economic Research, Inc.

ZHANG, K.H., 2001. How does foreign direct investment affect economic growth in China? *The Economics of Transition,* 9(3), pp. 679-693.

ZHANG, K.H. and MARKUSEN, J.R., 1999. Vertical multinationals and host-country characteristics. *Journal of Development Economics,* 59(2), pp. 233-252.

ZHANG, K.H. and SONG, S., 2001. Promoting exports: the role of inward FDI in China. *China Economic Review,* 11(4), pp. 385-396.

ZHANG, L., 1994. Location-specific advantages and manufacturing direct foreign investment in South China. *World Development,* 22(1), pp. 45-53.

ZHAO, H. and ZHU, G., 2000. Location factors and country-of-origin differences: An empirical analysis of FDI in China. *Multinational Business Review,* Spring.

ZOU, L. and SUN, L., 1996. Interest Rate Policy and Incentives of State-Owned Enterprises in the Transitional China. *Journal of Comparative Economics*, 23(3), pp. 292-318.