การศึกษาเปรียบเทียบผลกระทบทางเศรษฐกิจ ของการลงทุนโดยตรงจากต่างประเทศในกลุ่มประเทศเอเชียตะวันออก

นาย พลพัธน์ โคตรจรัส

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาเศรษฐศาสตร์ดุษฎีบัณฑิต
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COMPARATIVE STUDY OF MACROECONOMIC IMPACT OF FDI IN SELECTED EAST ASIAN COUNTRIES

Mr. Polpat Kotrajaras

A Dissertation Submitted in Partial Fulfillment of the Requirements
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Thesis Title	Comparative Study of Macroeconomic Impact of FDI in Selected East Asian Countries
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พลพัธน์ โคตรจรัส : การศึกษาเปรียบเทียบผลกระทบทางเศรษฐกิจของการลงทุนโดยตรงจากต่างประเทศในกลุ่มประเทศเอเชียตะวันออก. (COMPARATIVE STUDY OF MACRO ECONOMIC IMPACT OF FDI IN SELECTED EAST ASIAN COUNTRIES) อ. ที่ปรึกษาวิทยานิพนธ์หลัก : ผศ. ดร. บังอร ทับทิมทอง, อ. ที่ปรึกษาวิทยานิพนธ์ร่วม : รศ. ดร. ไพฑูรย์ วิบูลชุติกุล 202 หน้า.

ในช่วงหลายปีที่ผ่านมาประเทศต่างๆในภูมิภาคเอเชียตะวันออกได้มีความเชื่อมโยงทางเศรษฐกิจเพิ่มขึ้นเป็นอย่างมาก โดยเฉพาะอย่างยิ่งการลงทุนโดยตรงจากต่างประเทศซึ่งถือเป็นส่วนประกอบหลักที่สำคัญที่สุดของแหล่งเงินทุนจากต่างประเทศเมื่อเทียบกับการลงทุนประเภทอื่นๆ เพราะเป็นที่เชื่อว่าการลงทุนโดยตรงจากต่างประเทศนั้นจะก่อให้เกิดการเพิ่มขึ้นของอัตราการเจริญเติบโตทางเศรษฐกิจ ตลอดจนก่อให้เกิดความมีเสถียรภาพทางเศรษฐกิจ โดยผ่านทางกระบวนการจัดสรรทรัพยากรที่มีประสิทธิภาพมากขึ้น มีการเพิ่มขึ้นของปริมาณเงินทุน และการกระจายความเสี่ยง นอกเหนือจากนี้ยังก่อให้เกิดการพัฒนาในตลาดเงินทุน การพัฒนาสถาบันต่างๆ รวมถึงระบบการทำงานของรัฐที่มีประสิทธิภาพเพิ่มมากขึ้น มีการดำเนินนโยบายทางเศรษฐกิจมหภาคที่เหมาะสม อันจะนำไปสู่การเพิ่มขึ้นของประสิทธิภาพในการผลิตและการเจริญเติบโตของระบบเศรษฐกิจ อย่างไรก็ตาม การที่ประเทศต่างๆจะได้รับประโยชน์จากการลงทุนโดยตรงจากต่างประเทศอย่างเต็มที่ดังกล่าวนั้นขึ้นอยู่กับเงื่อนไขของระดับการพัฒนาระบบเศรษฐกิจด้วย ซึ่งประเทศเหล่านี้จะต้องมีพื้นฐานการพัฒนาตลาดเงินทุนในระดับที่สูงพอสมควร ตลอดจนมีการดำเนินการของรัฐที่มีประสิทธิภาพ มีระดับการเปิดประเทศ และมีการดำเนินนโยบายทางเศรษฐกิจมหภาคที่เหมาะสม

วิทยานิพนธ์ฉบับนี้ได้ถูกจัดทำขึ้นโดยมีวัตถุประสงค์เพื่อศึกษาเปรียบเทียบถึงผลกระทบของการลงทุนโดยตรงจากต่างประเทศในประเทศต่างๆในภูมิภาคเอเชียตะวันออกทั้งสิ้น 15 ประเทศ ซึ่งมีระยะเวลาของการศึกษาในช่วงตั้งแต่ปี 1990-2007 สำหรับแบบจำลองที่ใช้ในการศึกษาประกอบด้วย Panel Cointegration Analysis, GTAP model และ CAM model of the world economy ซึ่งผลของการศึกษาได้ยืนยันข้อสรุปว่าการลงทุนโดยตรงจากต่างประเทศสามารถกระตุ้นการเจริญเติบโตทางเศรษฐกิจของประเทศที่มีระดับรายได้สูงและปานกลางในภูมิภาคเอเชียตะวันออกได้ ขณะที่ผลการศึกษาในประเทศที่มีระดับรายได้ต่ำไม่สามารถสรุปได้ว่าการลงทุนโดยตรงจากต่างประเทศจะช่วยกระตุ้นอัตราการเจริญเติบโตทางเศรษฐกิจ นอกจากนี้ ผลการศึกษายังยืนยันว่าประเทศที่มีปัจจัยพื้นฐานทางเศรษฐกิจที่เหมาะสม ทั้งทางด้านการพัฒนาตลาดเงินทุน คุณภาพของบุคลากรภายในประเทศ ระดับของการเปิดประเทศ และการลงทุนในส่วนของโครงสร้างทางการผลิตในระดับที่เหมาะสม จึงจะได้รับผลประโยชน์จากการลงทุนโดยตรงจากต่างประเทศได้อย่างเต็มที่

สาขาวิชา เศรษฐศาสตร์ ลายมือชื่อนิสิต .....

ปีการศึกษา 2552 ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก .....

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์ร่วม .....

4886152829 : MAJOR ECONOMICS

KEYWORDS : FDI / EAST ASIAN

POLPAT KOTRAJARAS : COMPARATIVE STUDY OF MACROECONOMIC IMPACT OF FDI IN SELECTED EAST ASIAN COUNTRIES. THESIS ADVISOR : ASSISTANT PROFESSOR BANGORN TUBTIMTON, Ph.D., THESIS CO-ADVISOR : ASSOCIATE PROFESSOR PAITOON WIBOONCHUTIKULA, Ph.D., 202 pp.

During the past two decades, there has been a major shift in degree of financial integration in East Asian countries, especially foreign direct investment (FDI), which is the most important source of funds compare to other types of investment flows. FDI is accepted as a great role of increasing in economic growth and stability because it makes resource allocation process more efficiency, increase more capital, and risk diversification. However, the impact of FDI is different depending on host country's economic conditions. Host countries should have enough level of financial markets development, institution development, better governance, and appropriate macro policies in order to receive the highest benefit from FDI.

The objective of this paper is to examine the impact of FDI in 15 East Asian economies, using time series data for the period 1990-2007. Three methodologies including Panel Cointegration Analysis, GTAP model, and CAM model of the world economy are used to study impact of FDI in various aspects. The results show that FDI has a positive relationship with economic development only in countries which have more appropriate economic conditions. Moreover, the results verify that countries which have more high level of financial market development, human capital, trade openness, and high degree of investment in infrastructure tend to get more benefit from FDI.

Field of Study : Economics Student's Signature Polpat Kotrajaras

Academic Year : 2009 Advisor's Signature Bangorn Tubtimton

Co-Advisor's Signature Paitoon Wiboonchutikula

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I would also like to announce my sincerely thanks to all staff of the faculty for all the knowledge and assistance I have received. Thank all my friends for beautiful time during the study.

Any errors or omissions appear in this paper are solely my own responsibility.

CONTENTS

Page

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

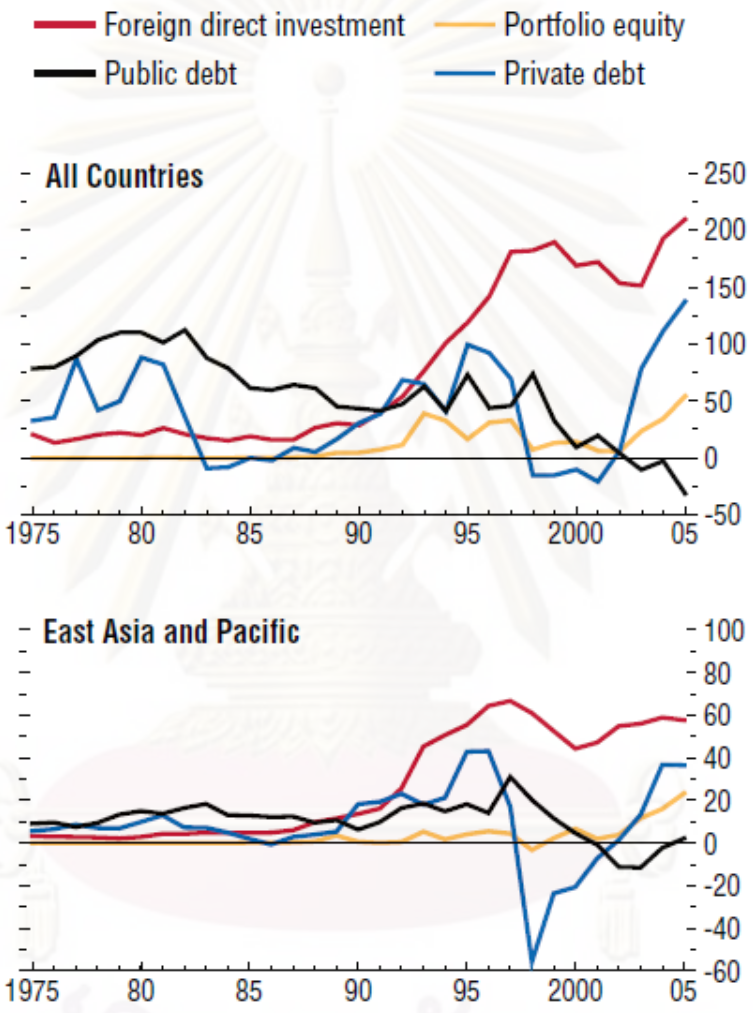
1.1 Statement of the Problem

During the past two decades, there has been a major shift regarding the size and composition in the cross-border financial flows to developing countries. A key factor underlying this process has been the increased globalization of investments seeking higher rates of return and the opportunity to diversify risk internationally. At the same time, many countries have encouraged inflows of capital by dismantling restrictions, deregulating domestic financial markets, and improving their economic environment and prospects through the introduction of market-oriented reforms. In particular, many developing and transition economies in East Asia, Latin America, and Eastern Europe have removed restrictions on international financial transactions, at the same time that they were relaxing regulations on the operation of domestic financial markets and moving away from regimes of financial repression. Policies aimed at increasing the openness of domestic financial markets to foreign investors have included the removal of controls on capital outflows and the liberalization of restrictions on foreign direct investment.

The increase in the degree of integration of world capital markets has been accompanied by a significant increase in private capital flows to developing countries (World Economic Outlook, 2008). As shown in Figure 1.1, foreign direct investment flows and portfolio flows (which consists of equities, bonds, and certificates of deposit) to developing countries started growing in the 1980s but expanded at an accelerated rate after 1990, until the late 1990s for the former component and until the mid-1990s for the latter. This pattern reflected to a large extent the increased incidence of financial volatility and currency crises in the second half of the 1990s, as discussed below. At the same time, bank-intermediated flows fell significantly in proportion of total flows. Short-term, cross-border capital flows have also become more responsive to changes in

relative rates of return, as a result of technological advances and increased linkages among capital markets.

Figure 1.1 Net Capital Flow to developing countries (billions of U.S. dollars)



Source: World Economic Outlook, IMF

Degree of financial integration can be measure by three ways: regulatory measures, quantity-based measures, and price-based measures. Regulatory measures indicate potentiality or limitation of integration stipulated by the rules and regulations of each country. The less restrictive these regulations are the more feasible capital may flow across borders. Quantity-based measures are concerned with the volume of

capital flows that actually take place, and the amount of capital that flows across borders is one indication of the degree of financial integration in the region. In price-based measures, more degree of financial integration should let prices to move together more uniformly or in some instances converge by the law of one price. Thus, a number of price variables are useful in assessing the degree of financial integration.

By all types of measures, we conclude that financial openness has generally improved in East Asia since the early 1990s but still lagged behind that in developed economies. We will go to the detail later in the next chapter of this study.

From Kose (2006), he gives the conceptual frameworks of financial integration that capital flows could directly increase GDP growth and reduce consumption volatility. However, today, the growth and stability benefits of financial globalization are also realized through a broad set called “collateral benefits” including financial market development, institutional development, better governance, and macroeconomic disciplines. These collateral benefits affect growth and stability dynamics indirectly, implying that the associated macroeconomic gains may not be fully evident in the short run.

Moreover, economic conditions in each country play important roles in shaping the macroeconomic outcomes of financial globalization. Countries meeting these threshold conditions are better able to reap the growth and stability benefits of financial globalization.

Among various types of capital flows, the relative importance of FDI flows has risen significantly in recent years, making it the most important form of private international financing for emerging market economies. There is a strong presumption in theory that FDI should yield more benefits than other types of financial flows since, in addition to augmenting domestic capital stock, it has a positive impact on productivity through transfers of technology and managerial expertise. It has also been argued that FDI tends to be the least volatile of the various types of capital flows, making countries less vulnerable to sudden stops or reversals of flows.

Although there are many empirical literatures supporting a significant positive role for financial globalization in term of FDI, there are also many unanswered questions about how a country which have difference in threshold conditions should organize and pace its move. At the same time, we find there is very little meaningful empirical argue that FDI or other types of capital flows are the root problem underlying most developing country financial crises of the past fifteen years. Therefore, an empirical analysis of this issue is needed as well for a better understanding of the role of FDI.

In this paper, we want to find the impact of financial integration, especially FDI, on economic growth and various aspects of the host countries in Asian economies. We also want to verify the impact of FDI to economic development by using methodologies which based on different theoretical concepts. Therefore, firstly, we will examine the impact of FDI on growth based on the framework of the solow and endogeneous growth model. Secondly we will find the effect of FDI on trade using the gravity equations. Thirdly, we specify a macroeconomic model based on CAM model of world economy framework to analyze the impacts of FDI on export and GDP; finally, we will summarize the results from these three models and synthesize all findings to draw implications on factors likely to be conductive for economic development.

1.2 Objective of the Study

My thesis is about examining the relationship between FDI, economic growth, international trade, and others macroeconomic variables i.e., exchange rate, interest rate, private consumption and investment, and government expenditure in East Asian countries. The period of study is form 1986 to 2007 because the available of the data. The major objectives of this study are:

1) To investigate the effect of FDI on economic growth in East Asian countries. In numerous papers studied about the effect of FDI on economic growth, most of the studies observe a positive relationship between FDI and

economic growth, while some of them detect a negative relationship between two variables.

In this study, instead of studying only the relationship between FDI and economic growth, we want to verify that countries which stay above threshold conditions including high level of education, high level of investment in infrastructure, and high level in trade openness will receive more benefit from FDI. Therefore, we will divide our sample countries into three groups by the different characteristic of education level, infrastructure, and trade openness.

2) To examine the effect of FDI on trade in East Asian countries. The question in this thesis is whether FDI and trade are complementing or substitutes, in other word, inward FDI is trade creating or trade replacing for East Asian countries. FDI is said to be complement for country when FDI lead to increase in trade between the host and the home countries. On the other hand, FDI is said to be substitute for country when FDI lead to increase in trade between the host and the home countries.
3) To examine the effect of FDI on macroeconomic variables including exchange rate, interest rate, private consumption, private investment, and government expenditure in East Asian countries in East Asian countries. In this part, we want to verify that inward FDI will make benefit to host country by make exchange rate appreciate, decrease inflation and exchange rate, and increase domestic consumption.
4) To compare the effects of FDI in difference methodologies. Differences in empirical methodologies could also account for some of the variations in results across papers. A variety of statistical methodologies allow us to deal with several econometric problems, including possible reverse causality. For example, Edison, Levine, Ricci, and Slok (2002) employ a variety of

statistical methodologies[1]; they conclude that there is no robustly significant effect of financial integration on economic growth, although the quantity-based measures and price-based measures of integration do tend to generate some results showing positive growth effects.

Specifically, the study aims to answer main questions as following:

1. What are the effects of FDI inflow on economic growth in East Asian Countries?
2. What are the effects of FDI inflow on international trade (exports and imports) in East Asian Countries?
3. What are the effects of FDI inflow on exchange rate, interest rate, private consumption, private investment, and government expenditure in East Asian countries in East Asian Countries?
4. Are the effects of FDI vary among countries which have different in characteristic of education level, infrastructure, and trade openness. Which countries will gain more benefit from FDI.

1.3 Scope of the Study

In this study, we will study the impacts of financial integration by emphasis of FDI. Because when we consider among different types of international capital flows, foreign direct investment (FDI) is the subject of many researches. It has increased substantially while the net debt flows have become of less importance and the portfolio flows have become firmly established (Aaron et al, 2001). For East Asia in particular, Kawai (2005) argues that FDI has stimulated rather than reduced trade, especially intra-

[1] They use a generalized method of moments estimation procedure in which, under certain assumptions, lagged values of changes in the explanatory variables can be used as instruments to control for potential endogeneity of all of the explanatory variables.

industry trade in manufactured products. FDI from Japan and the newly industrialized economies to China and Southeast Asia has played an important role in the development of regional production networks that have been associated with a high and rising degree of intraregional trade in East Asia.

The scope of study is limited to 15 countries in East Asian including Cambodia, China, Hong Kong, India, Indonesia, Japan, South-Korea, Laos, Malaysia, Myanmar, Philippines, Singapore, Taiwan, Thailand, and Vietnam.

The study focuses on investigating the impact of FDI on economic growth, international trade, and others macroeconomic variables including exchange rate, interest rate, private consumption and investment, and government expenditure. The methodology on investigating the impact of FDI on economic growth and international trade involves estimating economic models which provide for capturing the impact of FDI on economic development, using data for the period 1986-2007. Our secondary data were collected from several official publication sources such as the International Monetary Fund (IMF), World Bank, United Nation Conference on Trade and Development (UNCTAD), CEIC database. However, most of them came from IMF and UNCTAD. In investigating the impact of FDI on macroeconomic variables, we use two model including CAM model of world economy and GTAP model. In CAM model, we use CAM model database version 4.1 which is time series data from period 1970 to 2007. And for GTAP model, we use GTAP database version 5.

In order to compare the impacts of FDI among countries which have difference in threshold conditions, we group our sample countries into three groups by their level of income and we have (1) high income countries including Hong Kong, Japan, South-Korea, Singapore, and Taiwan (2) middle income countries including China, India, Indonesia, Malaysia, Philippines, and Thailand (3) low income countries including Cambodia, Lao, Myanmar, and Vietnam.

These three groups also have different characteristic of education level, infrastructure, and trade openness. In high income countries, there are high level of education, infrastructure, and trade openness. In middle income countries, there are high levels of investments in infrastructure and trade openness but not enough level of education. While in low income countries, there seem to have insufficient level of education, infrastructure, and trade openness.

Dividing countries into three groups also help us to avoid the problem of missing data in some countries during period 1986-1995 that make us cannot estimate economic models for each country individually.

1.4 Benefit of the Study

The findings from this study will help us understand how foreign direct investment effect economic development in East Asian countries. This will help policy makers in searching for policies that promote an economic growth and contribute to sustainable economic growth and development.

1.5 Organization of the Study

Throughout the study of impact of FDI in East Asian countries, after the introduction part in chapter one, chapter two provide picture of economic development in East Asian countries as well as the FDI policy in their changing of development. It focuses on the trends, sources of FDI inflows and international trade, and East Asian economic growths during 1986-2007.

Chapter three presents overview a review of literature on theoretical, empirical model, and empirical studies of impact of FDI on economic growth, international trade, and macro economy. The model which are used as a fundamental background for study

are the growth model, the gravity model, CGE model, and CAM model of world economy.

In chapter four, chapter five, and chapter six, methodology of the study will be presented to achieve the above-mentioned objectives of the study. In chapter four, the panel cointegration analysis is use to study the impact of FDI on economic growth and international trade. The endogenous growth model is applied to study the impact of FDI on economic growth and the gravity model is use to study the impact of FDI on international trade.

Chapter five and six is the analysis of impact of FDI on macro economy using GTAP model and CAM model of world economy, as follow. The data of the model, mo framework, and assumptions are also described in this chapter.

Finally, the conclusions will be presented in chapter seven. Some comments and suggestions for policy implementation and further studies are also presented in this last chapter. It also discusses some of the limitations of the study.

CHAPTER II
FINANCIAL INTEGRATION IN EAST ASIAN COUNTRIES

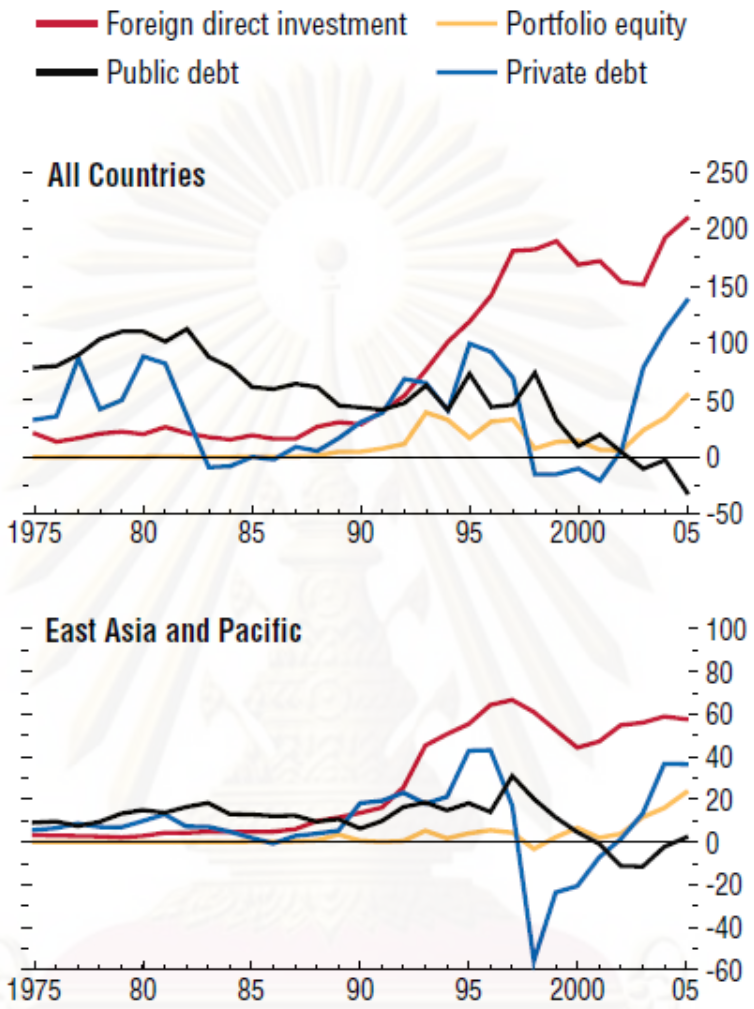
During this chapter, firstly, we begin about the overview of financial integration and economic development in East Asian countries. After that, national profile of each country is described to show the historical background including economic growth, trade and investment performance.

2.1 Overview of financial integration in East Asian countries

During the past two decades, there has been a major shift regarding the size and composition in the cross-border financial flows to developing countries, especially East Asian countries. As shown in Figure 2.1, foreign direct investment flows and portfolio flows developing countries started growing in the 1980s but expanded at an accelerated rate after 1990, until the late 1990s for the former component and until the mid-1990s for the latter. This pattern reflected to a large extent the increased incidence of financial volatility and currency crises in the second half of the 1990s, as discussed below. At the same time, bank-intermediated flows fell significantly in proportion of total flows. Short-term, cross-border capital flows have also become more responsive to changes in relative rates of return, as a result of technological advances and increased linkages among capital markets.

In measuring degree of financial integration, it can be broadly measure in three concepts: regulatory measures, quantity-based measures, and price-based measures. The regulatory measures indicate potentiality or limitation of integration stipulated by the rules and regulations of each country. The less restrictive these regulations are, the more feasible capital may flow across borders.

Figure 2.1 Net Capital Flow to East Asian countries (billions of U.S. dollars)



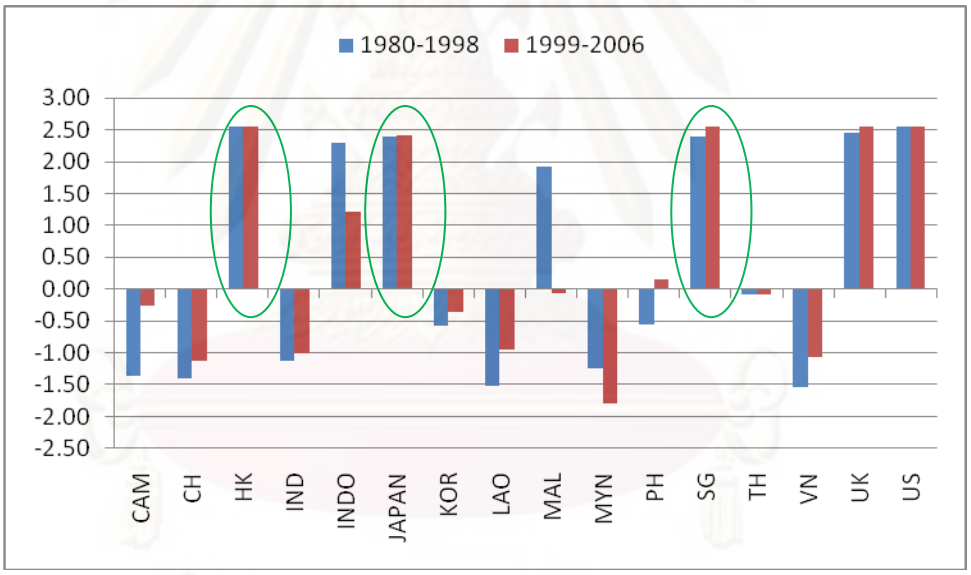
Source: World Economic Outlook, IMF

Quantity-based measures are concerned with the volume of capital flows that actually take place, and the amount of capital that flows across borders is one indication of the degree of financial integration in the region. Furthermore, the more capital flows between markets, the more liquid these markets become. With liquid capital markets, it is increasingly likely that arbitrage should work. As a result, prices should move together more uniformly or in some instances converge by the law of one price. Thus, a number of price variables are useful in assessing the degree of financial integration.

By using regulatory measures, financial openness has generally improved in East Asia since the early 1990s but still lagged behind that in developed economies.

In Figure 2.2, East Asian countries can be classified into three groups according to Chinn and Ito's (2004) financial openness index.[2] Hong Kong, Japan, and Singapore have a relatively high degree of openness during 1984-2004 comparable with that of the United States and the United Kingdom. The second group consists of Cambodia, China, India, Korea, Lao, the Philippines, Thailand, and Vietnam, with a low but rising level of openness. In the last group, capital account openness of Indonesia, Malaysia, and Myanmar sharply declines, especially that of Malaysia in line with attempts to slow the outflow of foreign investment in the wake of the 1997-98 financial crisis.

Figure 2.2 Chinn-Ito Financial Openness Index in East Asian countries



Source: (Hiro Ito, 2007: online)

[2] The Chinn-Ito openness index is based on cross-border restrictions on financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). First, based on the information given in the AREAER, four dummy variables related to restrictions on current account transactions, restrictions on capital account transactions, foreign exchange surrender requirements for export proceeds, and the presence of multiple exchange rates are constructed. Second, Chinn and Ito compute the standardized first principal component of these dummy variables which becomes the financial openness index. The index takes on higher values the more open a country is to cross-border capital transactions.

Table 2.1 Chinn-Ito Financial Openness Index in East Asian countries

	1980-1998	1999-2006
CAMBODIA	-1.37	-0.26
CHINA	-1.40	-1.13
HONG KONG	2.54	2.54
INDIA	-1.13	-1.00
INDONESIA	2.28	1.22
JAPAN	2.40	2.40
KOREA	-0.58	-0.35
LAO	-1.51	-0.94
MALAYSIA	1.92	-0.06
MYANMAR	-1.24	-1.80
PHILIPPINES	-0.55	0.14
SINGAPORE	2.39	2.54
THAILAND	-0.09	-0.09
VIETNAM	-1.54	-1.06
UK	2.45	2.54
US	2.54	2.54

Source: (Hiro Ito, 2007: online)

Whereas the above Chinn-Ito measure gives an overview of financial openness, Table 2.2 also provides specific features of controls on capital transactions in East Asian countries. Classifications of controls are as follows:

- Controls on capital and money market instruments.

  Capital market securities include shares, bonds, and other securities with an original maturity of more than one year. Money market instruments include treasury bills, short-term government papers, commercial papers, interbank

deposits, repurchase agreements, and other securities with an original maturity of one year or less. Collective investment securities include mutual funds, unit trusts, and investment trusts.

- Controls on derivatives and other instruments, such as rights, warrants, options, futures, forwards, and swaps.
- Controls on credit operations.

  Commercial credits are defined as those covering international transactions in trade and services, while financial credits are credits other than commercial credits.
- Controls on direct investment, that is, investment that is essentially for the purpose of producing goods and services and, in particular, investment that allows investor participation in the management of the enterprise.
- Controls on direct personal capital transactions.

  These include transfers to the beneficiary, for example, loans, gifts and endowments, and inheritances.

Table 2.2 shows that only Korea, Japan, and Singapore have low restrictions on capital transactions comparable to other East Asian countries. In Thailand, Indonesia, Lao, Philippines, and Malaysia are more restrictive. China has more controls than any other East Asian countries.

For controls on investment, figure 2.3 shows various degrees of regulations in East Asian countries. For inward investment, most countries including Singapore, Hong Kong, and Thailand either impose no restrictions or have some in specific industries such as banking, public utilities, and manufacture of arms (Japan, Korea, and Indonesia). For outward investment, it is generally more restricted than inward investment. Most countries are subject to various quantitative limits and/or regulatory

approval. Only Singapore and Hong Kong have no controls on both inbound and outbound direct investment.

Figure 2.3 Regulations on cross-border direct investments

Inward Investment

No restriction	Singapore, Hong Kong, Thailand
Limits for certain industries	Australia, New Zealand, Japan, Korea, Indonesia, Philippines, China
Approval required	Malaysia

Outward Investment

No restriction	Hong Kong, Singapore, Australia
Certain limits and/or approval required	New Zealand, Japan, Indonesia, Thailand, Korea, Malaysia, Philippines, Vietnam, China

Source: Annual Report on Exchange Arrangements and Exchange Restrictions, 2005

Considering cross-border portfolio investments, East Asian countries also set regulations on both inward and outward flows. Figure 2.4 shows that China, Indonesia, the Philippines, Thailand, and Korea are relatively restrictive compared with Singapore, Hong Kong, and Japan. In Figure 2.5, regulations on portfolio outflows are imposed on both residents and nonresidents in the form of required approval or documentation in China, Indonesia, Philippines, and Thailand. Only in Japan and Hong Kong have no restrictions on repatriation of capital and profits.

Table 2.2 Summary features of controls on capital transactions

Controls on:	CAM	CH	IND	INDO	JP	KOR	LAO	MAL	MYN	PH	SG	TH	VN
Capital and money market instruments													
Capital market securities	x	o	o	o	o	o	o	o	-	o	o	o	o
Money market instruments	x	o	o	o	o	o	o	o	-	o		o	o
Collective investment securities	x	o	o	o	o	o	o	o	-	o		o	o
Derivatives and other instruments	x	o	o	o	o		o	o	-	o		o	o
Commercial credits		o	o	o			o	o	o	o			o
Financial Credits		o	o	o	o		o	o	o	o	o	o	o
Guarantees, scurities, and financial backup facilities		o	o	o				o	o	o		o	o
Direct investment	o	o	o	o	o	o	o	o	o	o		o	o
Liquidation of direct investment		o	o						o				-
Real estate transactions	o	o	o	o	o	o	o	o	o	o	o	o	o
Personal capital movements		o	o				o	o	o	o		o	o

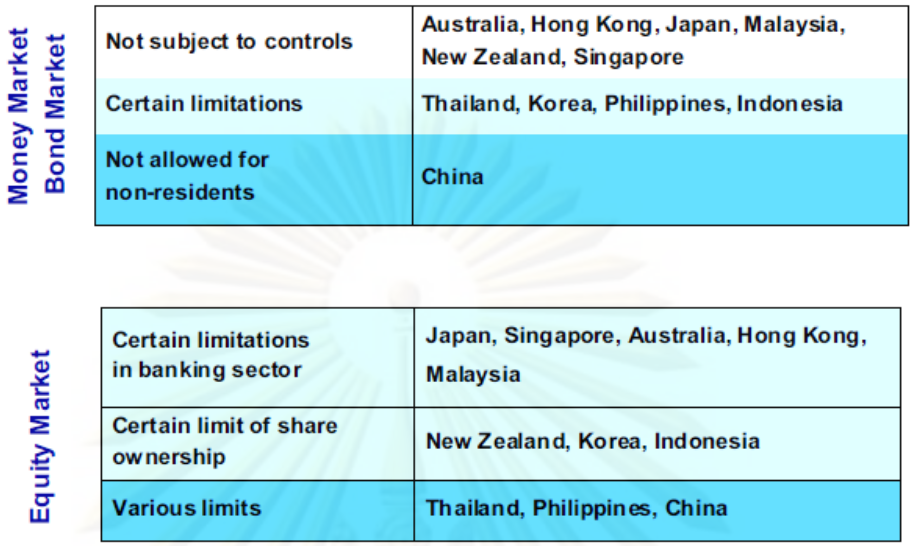
o indicates that the specified practice is a feature of the exchange system

x indicates that the specified practice is not regulated

- indicates that data were not available

Source: Annual Report on Exchange Arrangements and Exchange Restrictions, 2008

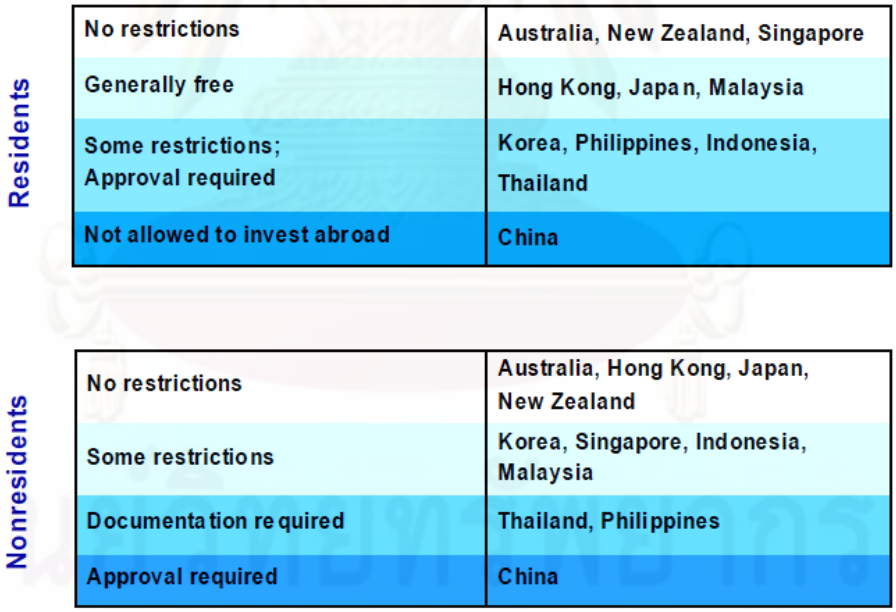
Figure 2.4 Regulations on portfolio investment inflows: Equity and Money Market



Money Market Bond Market	Not subject to controls	Australia, Hong Kong, Japan, Malaysia, New Zealand, Singapore
	Certain limitations	Thailand, Korea, Philippines, Indonesia
	Not allowed for non-residents	China
Equity Market	Certain limitations in banking sector	Japan, Singapore, Australia, Hong Kong, Malaysia
	Certain limit of share ownership	New Zealand, Korea, Indonesia
	Various limits	Thailand, Philippines, China

Source: Asian Bonds Online, IMF, 2005

Figure 2.5 Regulations on portfolio investment inflows: Residents



Residents	No restrictions	Australia, New Zealand, Singapore
	Generally free	Hong Kong, Japan, Malaysia
	Some restrictions; Approval required	Korea, Philippines, Indonesia, Thailand
	Not allowed to invest abroad	China
Nonresidents	No restrictions	Australia, Hong Kong, Japan, New Zealand
	Some restrictions	Korea, Singapore, Indonesia, Malaysia
	Documentation required	Thailand, Philippines
	Approval required	China

Source: Asian Bonds Online, IMF, 2005

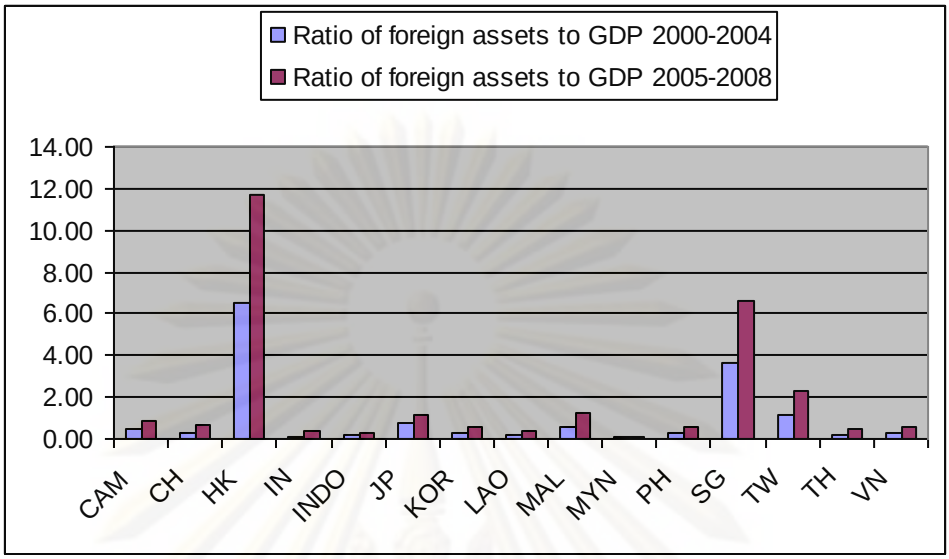
Although restrictions on capital flows discussed above are not directly measure financial integration, however, they suggest that most countries in East Asian still lack behind developed markets in terms of financial openness and integration to the global financial market. While capital account liberalization has gradually taken place in many

East Asian countries, some countries still have certain institutional and structural characteristics that constrain movements of cross-border flows. To get more benefits, these countries should relax the restrictions on cross-border investments, while at the same time appropriate prudential safeguards should be in place. Such a strategy could increase cross-border flows without generating either excessive volatility or disruption in regional financial markets and in the long term should enhance competition and enable local investors and firms to take advantage of regional markets.

In the second concept of measuring financial integration, quantity-based measures, while the regulatory measures described in the previous section are about the official policies toward capital flows, quantity-based measures and price-based measures reflect financial integration that has taken or is now taking place. Examples of quantity-based variables include stocks and flows of external assets and liabilities as well as international bank lending.

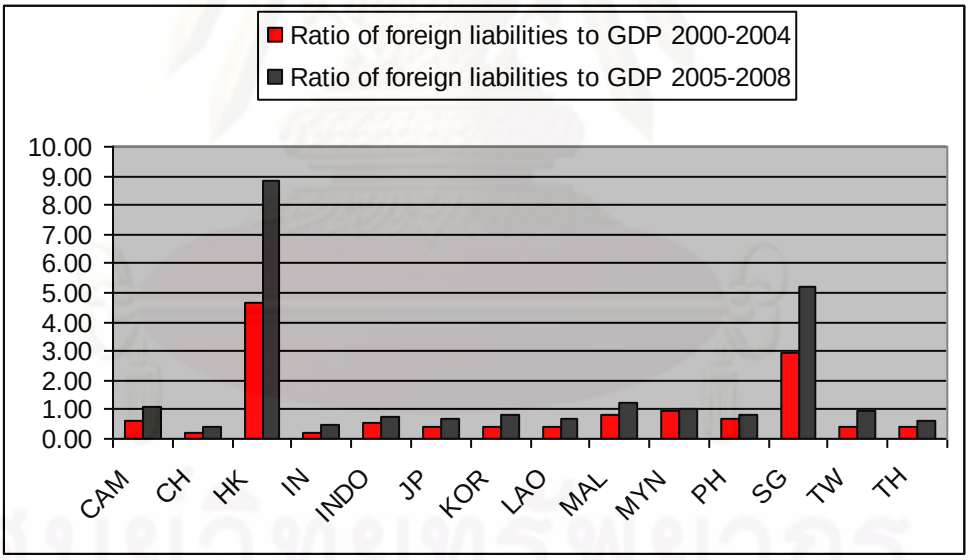
Using quantity-based measures, information about external assets and liabilities of East Asian economies can indicate the degree of the region's openness. Most emerging countries in East Asia have a negative net asset position partly as a consequence of restrictions on outbound investment. Foreign assets of Indonesia, Malaysia, the Philippines, and Thailand have been far below foreign liabilities. On the other hand, Japan, Hong Kong, and Singapore, which have a relatively low degree of capital restriction, have a positive net external position. If one takes into account the size of the economy, foreign asset holdings of all emerging East Asia relative to GDP are generally low compared with the European Union, as shown in Figure 2.6 Hong Kong and Singapore are exceptions, with a ratio of foreign assets to GDP above that of the European Union, possibly because these two countries are the main financial centers in East Asia.

Figure 2.6 Foreign Assets relative to GDP, 2000-2008



Source: International Financial Statistic, IMF

Figure 2.7 Foreign Liabilities relative to GDP, 2000-2008



Source: International Financial Statistic, IMF

Table 2.3 Foreign Assets and Liabilities relative to GDP

	Ratio of foreign assets to GDP		Ratio of foreign liabilities to GDP	
	2000-2004	2005-2008	2000-2004	2005-2008
CAM	0.49	0.86	0.60	1.07
CH	0.32	0.71	0.22	0.38
HK	6.47	11.71	4.63	8.83
IN	0.14	0.37	0.22	0.46
INDO	0.17	0.26	0.52	0.73
JP	0.76	1.14	0.42	0.68
KOR	0.31	0.61	0.41	0.84
LAO	0.17	0.41	0.39	0.68
MAL	0.55	1.27	0.80	1.26
MYN	0.06	0.11	0.93	1.05
PH	0.30	0.53	0.66	0.82
SG	3.65	6.63	2.95	5.19
TW	1.18	2.32	0.42	0.98
TH	0.21	0.52	0.42	0.64
VN	0.29	0.55	0.28	0.47
UK	11.25	17.53	11.68	18.38
US	0.60	1.34	0.76	1.54

Source: CEIC Database

In terms of cross-border portfolio investment, Figure 2.8 suggests that East Asia still lags behind the developed countries. For interregional and intraregional portfolio investment, East Asian intraregional investment records 110 billion U.S. dollars which is approximately 9 and 5 percent of the total portfolio inflows into and outflows out of East Asia respectively. Furthermore, for cross-border flows of portfolio investment to East Asia, 476 and 415 billion dollars are from North America and the Europe respectively—about four times more than 110 billion dollars originated within the region.

Figure 2.8 Intraregional and Interregional Portfolio Investments

	Investment from									
Investment to	**NAFTA**		**EU15**		**East Asia**		**Rest of the World**		**Total Global**	
Total Portfolio Investment										
NAFTA	545	(15.8)	1,776	(18.6)	747	(33.5)	1,620	(43.4)	4,688	(24.7)
EU15	1,614	(46.7)	6,058	(63.5)	804	(36.1)	1,455	(39.0)	9,931	(52.4)
East Asia	476	(13.7)	415	(4.4)	110	(4.9)	165	(4.4)	1,166	(6.2)
Rest of the World	823	(23.8)	1,292	(13.5)	566	(25.5)	492	(13.2)	3,173	(16.7)
Total Global	3,458	(100.0)	9,541	(100.0)	2,227	(100.0)	3,732	(100.0)	18,958	(100.0)
Long-Term Debt Securities										
NAFTA	195	(21.4)	861	(15.3)	559	(34.1)	1,071	(45.8)	2,686	(25.5)
EU15	413	(45.4)	3,887	(69.0)	627	(38.2)	909	(38.9)	5,836	(55.5)
East Asia	54	(5.9)	107	(1.9)	45	(2.7)	79	(3.4)	285	(2.7)
Rest of the World	248	(27.3)	776	(13.8)	409	(24.9)	278	(11.9)	1,711	(16.3)
Total Global	910	(100.0)	5,631	(100.0)	1,640	(100.0)	2,337	(100.0)	10,518	(100.0)
Equity Securities										
NAFTA	312	(13.4)	800	(23.7)	165	(34.7)	217	(26.7)	1,494	(21.4)
EU15	1,042	(44.8)	1,806	(53.6)	132	(27.8)	357	(43.9)	3,337	(47.8)
East Asia	418	(18.0)	315	(9.3)	52	(10.9)	56	(6.9)	841	(12.0)
Rest of the World	555	(23.9)	450	(13.3)	126	(26.5)	184	(22.6)	1,315	(18.8)
Total Global	2,327	(100.0)	3,371	(100.0)	475	(100.0)	814	(100.0)	6,987	(100.0)

Source: Asia Bond Monitor Report, 2005

In sum, this section finds that, based on quantity measures, the degree of financial openness of East Asian countries is relatively low compared with that of the European Union. Furthermore, global and regional financial integration of East Asian countries have developed at different paces, with intraregional integration falling behind that of integration with the global financial system.

The third concept to measure financial integration is concerned with prices and their behavior. It eventually comes to a check of the law of one price, which states that assets with identical risks and returns characteristics should be priced identically regardless of where in the financially integrated area they are transacted. How it works is that financial integration acts to bring greater opportunities for arbitrage, which in turn reduces discrepancies in prices of assets with similar characteristics toward zero. This definition of financial integration is adopted by the European Central Bank (Beale et al., 2006; Trichet, 2006). In practice, however, there are few assets that are exactly identical, and consequently the strict application of the law of one price as a test for financial integration may be of limited use. For those assets which have broadly similar characteristics, instead of looking at whether they are identically priced, one should take

into account differences in systematic risk factors and other important characteristics and then assess whether price dispersion is warranted. In other words, variation in prices of assets with similar profiles should decrease as financial integration advances. In what follows, various price measures that may help determine the extent of East Asian financial integration are introduced, namely, overnight interbank interest rates, stock prices, and foreign exchange rates.

Another type of markets in which price movements could indicate the degree of financial integration is stock markets. Chaipat (2006) computes the cross-country correlations between stock markets since 2000—presumably with the effects of the 1997 financial crisis had died down—in two sub periods, namely 2000-2003 and 2004-2006. These correlations show that cross-country linkages between East Asian stock markets have become tighter. In particular, markets in Korea, the Philippines, Singapore, and Thailand move closer together, while China still exhibits negative co-movement with the other markets. Furthermore, correlation between each Asian market (except that of China) and the U.S. market is quite high recently, and even though the degree of co-movement declines in some instances, it still remains above 0.70. In sum, with the exception of China, East Asian stock markets have moved closer with each other and also with the U.S. market. He concludes that, in the foreign exchange market, bilateral exchange rate interdependence among East Asian currencies can be assessed by examining the degree to which exchange rates move together. The left panel of Figure 2.10, constructed using monthly data on exchange rates between 1986 and 1995, displays a matrix of pairwise correlation coefficients for any two currencies. The right panel is similarly constructed for a later sample period. To exclude the effects of volatility during 1997-98, a sample between 2000 and 2006 is selected. The darker shaded cells indicate correlation coefficients that are greater than 0.50; the lighter shaded cells indicate those between 0.25 and 0.50. These two matrices show Asian currencies moved together to a greater extent during 2000-06 relative to 1986-95.

Figure 2.9 Pairwise Correlation Matrices for Stock Prices

	CHN	HKG	IDN	JPN	KOR	MYS	PHL	SGP	THA	US
CHN	1.00									
HKG	0.47	1.00								
IDN	-0.36	0.46	1.00							
JPN	0.66	0.89	0.21	1.00						
KOR	-0.38	0.32	0.62	0.24	1.00					
MYS	-0.51	0.30	0.82	0.11	0.81	1.00				
PHL	0.26	0.81	0.58	0.75	0.52	0.49	1.00			
SGP	0.18	0.83	0.56	0.76	0.66	0.61	0.92	1.00		
THA	-0.53	0.31	0.91	-0.03	0.52	0.72	0.39	0.37	1.00	
US	0.46	0.90	0.36	0.86	0.38	0.29	0.85	0.87	0.16	1.00

	CHN	HKG	IDN	JPN	KOR	MYS	PHL	SGP	THA	US
CHN	1.00									
HKG	-0.33	1.00								
IDN	-0.45	0.92	1.00							
JPN	-0.12	0.80	0.77	1.00						
KOR	-0.30	0.91	0.88	0.94	1.00					
MYS	-0.31	0.85	0.81	0.60	0.75	1.00				
PHL	-0.52	0.86	0.96	0.73	0.85	0.77	1.00			
SGP	-0.48	0.95	0.97	0.83	0.93	0.81	0.93	1.00		
THA	-0.09	0.82	0.73	0.72	0.78	0.67	0.67	0.73	1.00	
US	-0.01	0.84	0.80	0.81	0.82	0.70	0.73	0.78	0.82	1.00

correlation coefficient greater than previous period

Source: Bank of Thailand, 2005

Figure 2.10 Pairwise Correlation Matrices for Exchange Rates

	CHN	HKG	IDN	JPN	KOR	MYS	PHL	SGP	THA
CHN									
HKG		1.00							
IDN		-0.80	1.00						
JPN		0.74	-0.85	1.00					
KOR		-0.19	-0.25	0.11	1.00				
MYS		0.26	-0.06	0.25	-0.58	1.00			
PHL		-0.71	0.77	-0.61	-0.10	0.16	1.00		
SGP		0.86	-0.93	0.84	0.13	0.13	-0.83	1.00	
THA		0.56	-0.78	0.92	0.28	0.20	-0.56	0.77	1.00

	CHN	HKG	IDN	JPN	KOR	MYS	PHL	SGP	THA
CHN	1.00								
HKG	0.21	1.00							
IDN	-0.09	0.29	1.00						
JPN	0.09	0.50	0.42	1.00					
KOR	0.27	0.38	0.37	0.82	1.00				
MYS	1.00	0.20	-0.09	0.07	0.24	1.00			
PHL	-0.17	-0.48	-0.45	-0.75	-0.70	-0.16	1.00		
SGP	0.16	0.37	0.41	0.92	0.91	0.13	-0.70	1.00	
THA	0.04	0.48	0.58	0.84	0.81	0.02	-0.71	0.86	1.00

correlation coefficient > 0.50
correlation coefficient ∈ [0.25, 0.50]

Source: Bank of Thailand, 2005

By using three types of measuring financial integrations, as discuss above, we conclude that although the degree of intraregional financial integration in East Asian countries lags behind that of integration with the global financial system, East Asian economies are increasingly integrated financially, with cross-border capital flows becoming better intermediated within the region.

It is important to be aware that empirical evidence yields diverse conclusions about the effects of international financial integration. Quinn (1997), using his own measure of capital account openness, reports a positive association between capital account liberalization and long-run growth. Klein and Olivei (1999) report a positive relationship but one largely driven by the experience of the developed countries in their sample. On the other hand, Grilli and Milesi-Ferretti (1995), Rodrik (1998), and Kraay (1998) find no link between economic growth and financial integration. Prasad et al. (2004) find that there is no strong support for the theoretical argument that globalization delivers a higher rate of economic growth.

With the surge in financial flows and a spate of currency and financial crises in the late 1980s and 1990s, there is a widely held perception that developing countries that opened up to capital flows have been more vulnerable to these crises than industrial economies, and have been much more adversely affected. These developments have sparked a fierce debate among both academics and practitioners on the costs and benefits of financial globalization.

Some academic economists view increasing capital account liberalization and unfettered capital flows as a serious impediment to global financial stability (Rodrik, 1998; Bhagwati, 1998; Stiglitz, 2002), leading to calls for capital controls and the imposition of frictions, such as “Tobin taxes,” on international asset trade. Others argue that increased openness to capital flows has proven essential for countries aiming to upgrade from lower- to middle-income status, while significantly enhancing stability among industrialized countries (Fischer, 1998; Summers, 2000). This is clearly a matter

of considerable policy relevance, especially with major economies like China and India recently taking steps to open up their capital accounts.

2.1.1 Foreign Direct Investment in East Asian countries

For all types of capital flows, foreign direct investment (FDI) is the most important source of funds compare to other types of investment flows. During 1990 – 2000, inward FDI in East Asia has increased hugely. The volume of FDI inflows to the sample countries were as high as 160 billion USD, compare to only 15 billion in 1991, which was almost ten times increase in ten years. Even in 1997, the year of Asian crisis, the value of inward FDI to the selected countries dropped only about 2%. In addition, the situation recovered quite fast as in 1998 the value of inward FDI to the country grew about 6%. At this time, China and Hong Kong are the major recipients in the East Asia region and among the developing countries (UNCTAD, 2002). Singapore is other high-shared destinations.

Today, the global economic and financial crisis spread to East and South-East Asia with a moderate time lag, affecting the region's exports as well as economic growth. A sharp fall in external demand has caused exports to plunge, and economic growth has slowed down in many countries in the region. Particularly in the newly industrializing economies (NIEs), GDP started to fall significantly in the fourth quarter of 2008, and a deep recession is inevitable. However, FDI inflows grew considerably in 2008, although slower than in the previous two years. Nevertheless, the 17% growth rate for the year as a whole does not reflect the current situation in a number of Asian economies, as the crisis started to have an impact on FDI inflows mainly in the last quarter of the year. As a result, the region is facing a downturn in FDI inflows in 2009 (International Investment report, UNCTAD, 2009).

Despite the impact of the global financial and economic crisis on host economies in South, East and South-East Asia, total FDI inflows to the region in 2008 still rose by 17%, reaching $300 billion. Part of this increase was due to the growth in cross

border M&As (especially intraregional ones). However, FDI inflows started to fall in 2009 in all major host economies, including China, Hong Kong, and India and the value of cross-border M&A sales in the region dropped sharply in the first half of 2009. Like other developing regions, South, East and South-East Asia cannot escape the shock of the global financial crisis. In particular, since the region's economies are heavily dependent on exports, falling external demand has slowed down economic growth since the last quarter of 2008. This in turn is dragging down FDI and does not bode well for short-term FDI prospects in the region.

FDI inflows to East Asia, South-East Asia and South Asia in 2008 amounted to $187 billion, $60 billion and $51 billion respectively. In 2007, the rate of growth of inflows to the three sub regions was quite similar, but in 2008 growth rates varied considerably: 49% in South Asia, 24% in East Asia, and -14% in South-East Asia. The performance of major economies in the region in attracting FDI also varied significantly. One of the features of FDI flows to the region during the past few years has been the steadily growing importance of China and India as host economies. With its inflows surging to $108 billion in 2008, China became the third largest FDI recipient country (after the United States and France) in the world. India ranked 10 places behind, but was catching up. Their strong performance, even during the current crisis, has reshaped the landscape of FDI flows to the region as well as to the world at large.

Due to the heavy reliance of East and South-East Asia on trade, the impact of the current financial crisis on the region's economic performance will be much deeper than was anticipated, and will inevitably have a negative impact on FDI flows in the short to medium term.

Table 2.4 Inward FDI to the sampling countries during 1992-2007 (Million USD)

	Cambodia	China	Hong Kong	India	Indonesia	Japan	Korea	Laos	Malaysia	Myanmar	Philippines	Singapore	Taiwan	Thailand	Vietnam
1992	337	36,990	7,697	277	5,961	11,301	1,979	156	15,970	197	1,112	18,050	5,249	5,350	3,681
1993	441	78,210	13,796	550	7,465	3,459	1,811	144	14,101	156	5,219	14,355	5,545	4,375	5,997
1994	415	100,799	14,367	973	7,385	4,760	2,541	259	12,143	100	6,729	24,713	5,803	3,319	7,978
1995	779	111,273	21,058	2,144	14,879	3,673	5,688	368	14,298	147	6,597	26,187	6,577	4,873	8,875
1996	1,266	127,558	34,496	2,426	22,233	3,245	6,692	442	17,803	135	6,462	27,488	8,680	5,822	9,345
1997	1,195	143,817	34,910	3,577	16,119	12,776	8,777	318	15,707	145	5,105	28,184	10,228	10,864	9,879
1998	876	142,147	49,071	2,635	14,146	11,570	16,581	185	10,493	57	8,342	20,600	9,395	25,280	6,286
1999	780	124,168	95,684	2,169	18,489	48,056	30,287	228	18,493	46	9,063	47,749	13,148	25,164	5,765
2000	1,067	122,862	85,237	3,584	15,710	32,672	27,630	158	15,382	58	6,377	58,226	21,853	15,218	4,676
2001	838	138,239	92,792	5,472	10,573	24,573	12,529	109	8,814	1,718	4,914	51,455	22,767	16,637	4,445
2002	686	151,220	126,766	5,626	10,311	39,183	9,845	132	14,623	1,997	10,216	45,854	8,634	16,875	3,997
2003	574	141,721	146,996	4,323	11,433	25,375	12,771	96	11,902	2,400	2,946	56,050	2,444	22,394	4,588
2004	609	158,793	159,912	5,771	9,760	32,242	25,178	98	23,827	2,287	4,260	74,841	9,272	22,588	4,847
2005	2,020	177,309	160,759	6,677	24,299	13,657	23,743	167	20,969	2,243	12,833	71,334	8,193	27,698	6,129
2006	2,495	177,525	206,122	17,453	20,418	42,010	16,872	617	28,936	2,013	21,161	109,116	35,089	31,626	7,611
2007	4,518	268,628	295,176		27,700	96,352	8,611	1,087	38,464	3,776	20,610	96,809	38,718	35,821	18,078

Source: UNCTAD's World Investment Report, 1994 – 2008

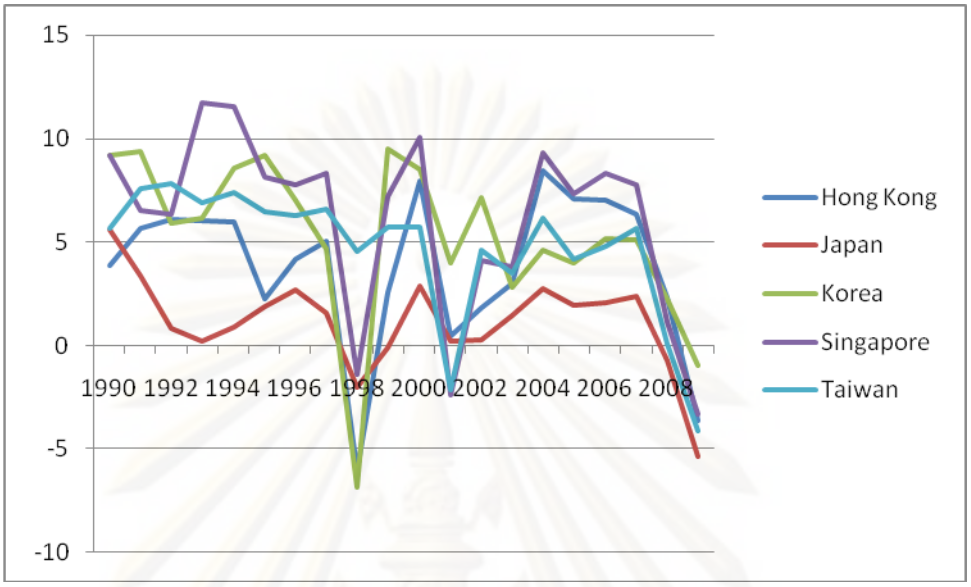
From previous section, we conclude that financial integration in East Asian countries increase dramatically during past two decade. In next part, we review about economic condition of East Asian countries. As we discuss in the previous section that the impacts of FDI is different in countries which have difference in threshold conditions, in this study, we divide our sample countries into three groups by their level of income and we have (1) high income countries including Hong Kong, Japan, South-Korea, Singapore, and Taiwan (2) middle income countries including China, India, Indonesia, Malaysia, Philippines, and Thailand (3) low income countries including Cambodia, Lao, Myanmar, and Vietnam.

2.2 Economic Conditions in High income countries (Hong Kong, Japan, South Korea, Singapore, and Taiwan)

2.2.1 Economic Growth

In high income countries including Hong Kong, Japan, South Korea, Singapore, and Taiwan, their economic growth rates were increasing since 1990 and the average growth rates around 5-8 percent, except Japan. However, due to effectiveness of Asian financial crisis in 1997-1998, the GDP growth rates were become negative in 1998; the countries that have highest effect from financial crisis are Hong Kong, and Korea. The economy was successfully recovery after the crisis and developed at 5% of growth rate in 2001-2005. In 2007, because of the world economic recession, their economic growth rates become negative again.

Figure 2.11 GDP growth in High income countries, 1990-2008



Source: International Monetary Fund, 2010

2.2.2 International trade

Figure 2.12 shows that in that the international trade of high income countries has increased significantly since 1990. Total trade of this group grew from $1000 billion in 1990 to $3500 billion in 2008, which is up by 3.5 times compared to 1990. The average of total trade from 1990-2008 is 1900 billion USD. The total value and growth rate in each period is quite high. The average growth rate in this group is 6.8% during 1991-2000 and become 9% during 2000-2008.

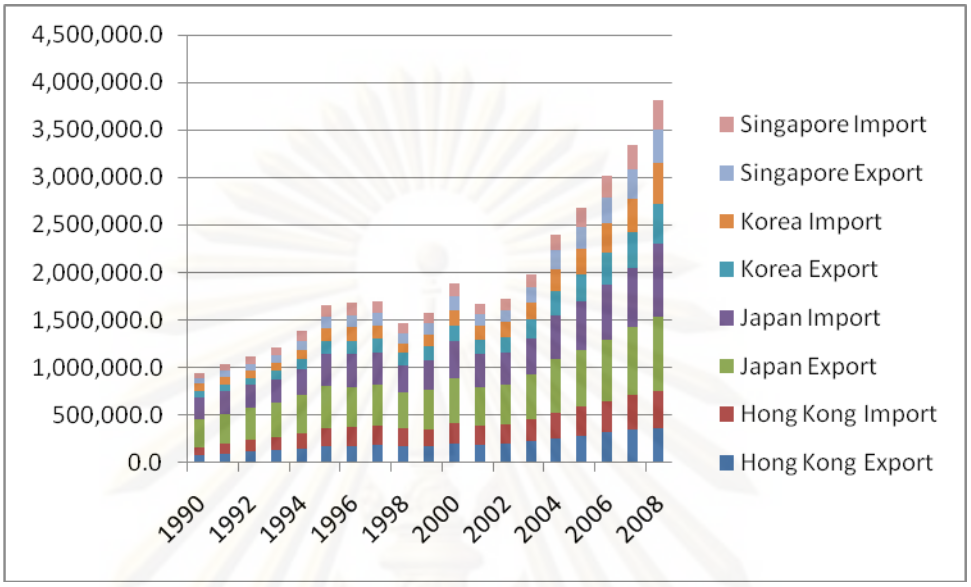
The share of exports in total trade is stay around 52% for the whole period and the growth rate of imports is stay around 47%. Within this group, Japan is the countries which has highest share of export and import, follow by Hong Kong and Korea.

Table 2.5 GDP in High income countries, 1990-2008 (Billion USD)

	Hong Kong	Japan	Korea	Singapore	Taiwan
1986	19.01	1909.45	50.84	13.49	58.43
1987	25.49	2311.20	67.57	15.50	79.29
1988	32.82	2813.53	97.34	20.29	97.28
1989	42.69	2877.78	126.55	25.09	121.97
1990	51.33	3027.45	160.08	31.95	136.51
1991	64.66	3539.81	206.97	39.23	158.59
1992	83.22	3917.32	238.43	46.15	194.27
1993	104.34	4508.53	278.36	56.06	212.57
1994	125.51	4958.87	350.98	70.16	236.77
1995	139.08	5435.31	460.30	85.61	262.29
1996	162.12	4763.00	521.78	95.26	285.59
1997	190.03	4395.74	505.38	99.34	301.05
1998	181.30	3976.86	357.82	83.88	284.42
1999	169.45	4445.77	460.92	79.65	303.67
2000	169.12	4667.45	533.39	92.72	321.19
2001	163.45	4045.14	524.06	84.24	293.10
2002	155.12	3810.32	617.49	86.00	298.38
2003	140.95	4046.82	714.79	89.78	302.28
2004	142.24	4359.96	825.95	110.33	324.68
2005	152.34	4256.22	972.87	123.15	346.97
2006	162.28	4042.28	1094.40	143.67	354.46
2007	182.11	4032.06	1231.57	181.95	373.44
2008	192.06	4479.57	1120.39	200.55	370.77

Source: International Monetary Fund, 2010

Figure 2.12 Export and Import: High income countries, 1990-2008 (Million USD)



Source: International Monetary Fund, 2010

The major trade partner of each country is showed in table 2.6. For Hong Kong, the major trade partners are China, United Stated, and Japan, especially China which has exports and imports share above 40%. In Korea and Japan, the major trade partners are also China, United Stated. In Singapore, Malaysia is the country which has highest share of exports and imports: follow by United Stated.

Table 2.6 Major trade partner: High income countries, 1990-2008 (%)

Hong Kong				Japan			
Export		Import		Export		Import	
China	43.96	China	44.91	United States	23.65	China	19.24
United States	16.98	Japan	10.92	China	12.60	United States	13.79
Japan	5.05	Singapore	5.69	Korea	7.37	Saudi Arabia	5.09
Germany	3.24	United States	5.40	Hong Kong	5.77	UAE	4.75
United Kingdom	3.17	Korea	4.47	Thailand	3.46	Korea	4.60
Singapore	2.03	Malaysia	2.35	Germany	3.37	Indonesia	4.20
Korea	1.98	Thailand	1.93	Singapore	3.33	Germany	3.32
Netherlands	1.67	Germany	1.87	United Kingdom	2.57	Malaysia	3.10
France	1.39	India	1.49	Netherlands	2.49	Thailand	2.95
Australia	1.24	Philippines	1.48	Malaysia	2.31	Qatar	2.30
Others	19.29	Others	19.49	Others	33.10	Others	36.66

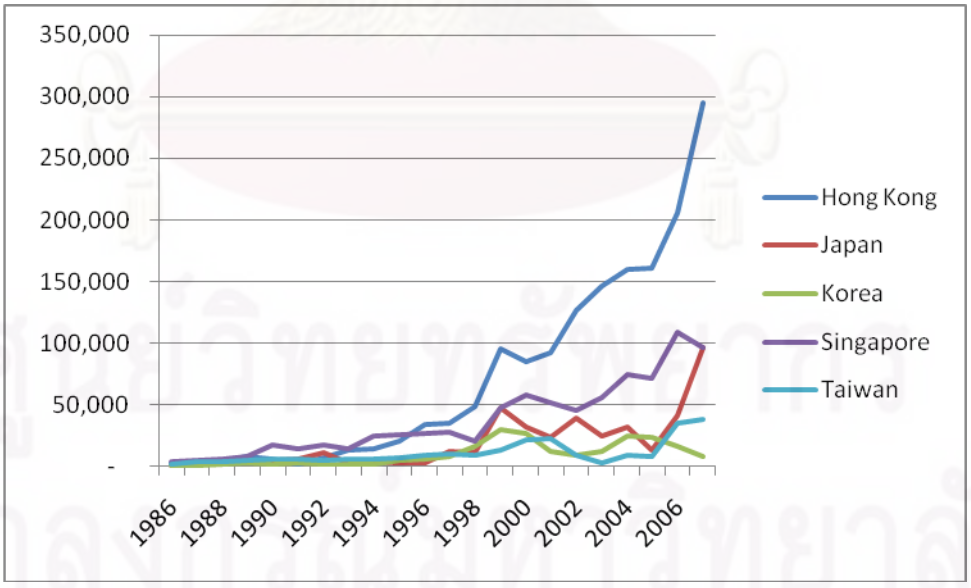
Korea				Singapore			
Export		Import		Export		Import	
China	19.16	Japan	17.49	Malaysia	13.97	Malaysia	14.23
United States	15.19	China	14.51	United States	11.02	United States	12.92
Japan	8.36	United States	12.13	Hong Kong	9.58	Japan	10.30
Hong Kong	5.79	Saudi Arabia	6.21	China	7.92	China	9.65
Germany	2.99	UAE	3.67	Indonesia	7.79	Indonesia	4.45
Singapore	2.95	Germany	3.57	Japan	5.75	Korea	4.40
United Kingdom	1.98	Indonesia	2.86	Thailand	4.09	Thailand	3.81
Indonesia	1.73	Malaysia	2.46	Korea	3.60	Saudi Arabia	3.72
Malaysia	1.66	Qatar	2.22	Australia	3.43	Germany	3.10
Mexico	1.66	Kuwait	2.22	India	2.71	Philippines	2.15
Others	38.53	Others	32.65	Others	30.12	Others	31.28

Source: CEIC Database

2.2.3 Foreign direct investment

Figure 2.13 shows the overall trend of FDI inflows in High Income Countries. Overall of FDI inflow is increasing dramatically during 2000-2006. Today, among the Asian NIEs, Singapore and Taiwan were hit the hardest by the world financial crisis, with economic growth and FDI inflows declining significantly in 2007. AS one of the region's most open economies and its financial and logistics centers, Singapore has been shaken by the global financial crisis, slipping into economic recession. As a result, it saw its FDI inflows drop in 2008. On the other hand, the Republic of Korea saw a surge in inflows. Republic of Korea following a continuous decline in FDI inflows during the period 2005–2007 but FDI resumed growth and surged in 2008. By the way, FDI in Hong Kong still increasing and the value of FDI inflows is very high comparing to others countries.

Figure 2.13 Foreign Direct Investments in High income countries, 1990-2008 (Million USD)



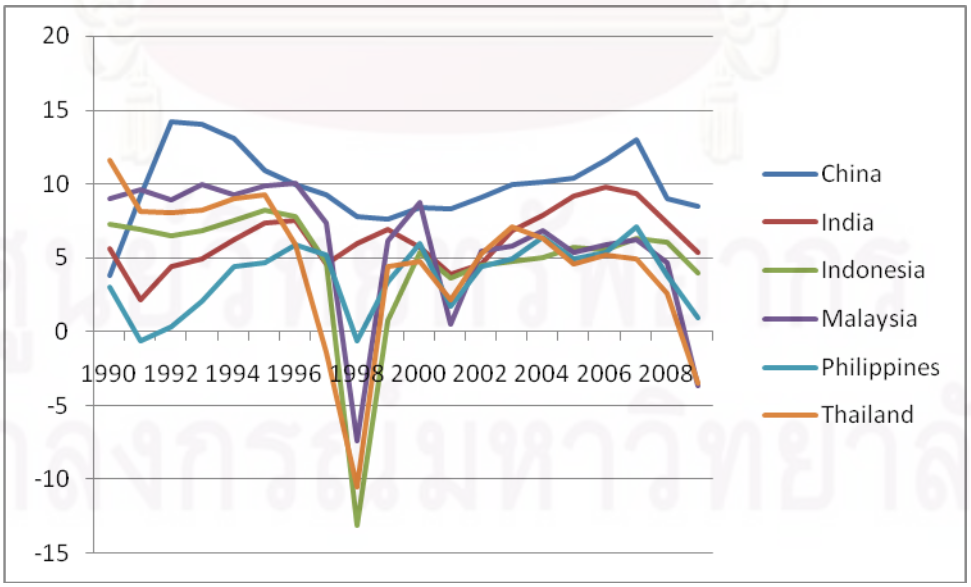
Source: UNCTAD, World Investment Report

2.3 Economic Conditions in Middle income countries (China, India, Indonesia, Malaysia, Philippines, and Thailand)

2.3.1 Economic Growth

In middle income countries including China, India, Indonesia, Malaysia, Philippines, and Thailand, China is the country which has the highest growth rate compare to other countries. China economic growth rate was increasing since 1990 and the average growth rates is about 10 percent. Due to effectiveness of Asian financial crisis in 1997-1998, despite the decline of GDP growth into negative rate in other countries, GDP growth rate in China still around 7%. The countries that have highest effect from financial crisis are Indonesia, and Thailand which their growth rate are below than -10%. The economies were successfully recovery after the crisis and developed at their growth rate in 2001-2005. In 2007, because of the world economic recession, their economic growth rates declined again and the growth rates become negative in Thailand and Malaysia..

Figure 2.14 GDP growth in middle income countries, 1990-2008



Source: International Monetary Fund, 2010

Table 2.7 GDP in middle income countries, 1990-2008 (Billion USD)

	China	India	Indonesia	Malaysia	Philippines	Thailand
1986	111.48	78.44	14.96	15.79	8.92	23.74
1987	127.65	94.01	16.41	18.98	10.66	29.16
1988	178.53	111.67	19.60	21.56	13.33	37.69
1989	216.39	120.04	25.01	24.80	16.37	46.85
1990	197.99	142.65	30.89	29.18	19.10	58.71
1991	221.79	143.04	38.35	34.76	22.85	69.77
1992	286.45	158.87	44.17	42.85	28.89	82.94
1993	414.18	170.24	55.48	50.39	31.67	95.35
1994	455.56	212.58	66.94	58.32	41.06	118.85
1995	674.28	263.74	84.06	72.08	52.04	146.12
1996	843.94	284.60	102.55	84.85	62.59	164.58
1997	953.45	349.19	109.76	87.21	65.99	142.03
1998	1011.61	380.40	85.11	68.18	57.97	115.02
1999	1061.42	423.79	142.51	74.80	71.61	121.00
2000	1198.48	461.91	165.52	93.79	75.91	122.73
2001	1351.91	489.62	183.62	91.32	75.76	117.93
2002	1492.18	528.25	236.74	102.35	85.40	130.56
2003	1728.19	635.04	299.83	115.54	91.88	148.73
2004	2174.84	780.88	356.19	138.65	106.40	173.49
2005	2612.89	955.38	452.96	160.51	128.81	198.14
2006	3219.23	1113.68	658.67	189.71	161.10	244.33
2007	4401.48	1470.29	869.21	235.81	203.22	299.82
2008	6036.50	1731.50	1217.66	309.84	253.25	348.00

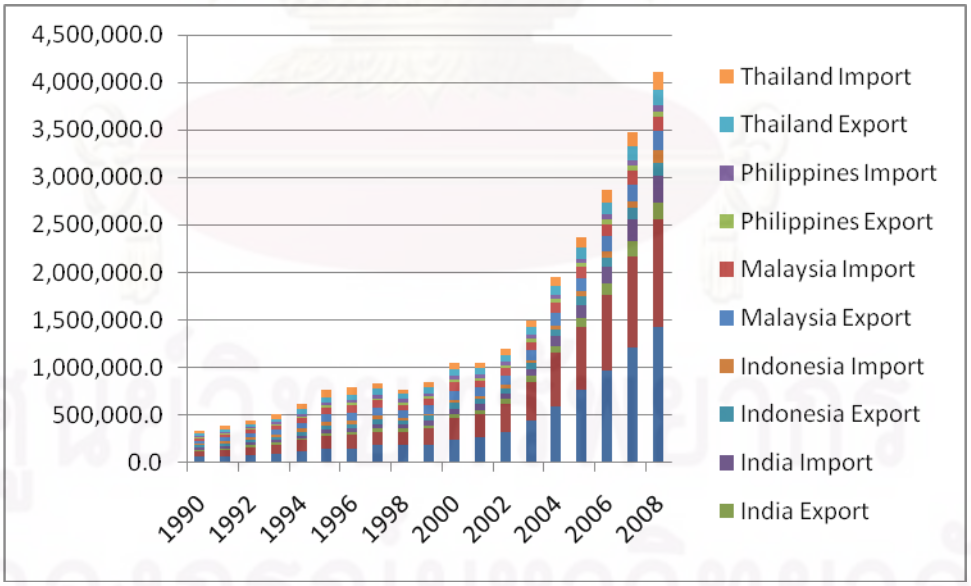
Source: International Monetary Fund, 2010

2.3.2 International trade

Figure 2.15 shows that in that the international trade of middle income countries has increased significantly since 1990. Total trade of this group grew from $300 billion in 1990 to $4500 billion in 2008, which is up about 10 times compared to 1990. The average of total trade from 1990-2000 is about 700 billion USD and about 2300 billion USD in 2001-2008. The total value and growth rate in each period is quite high. The average growth rate in this group is 12% during 1991-2000 and become 19% during 2000-2008.

The share of exports in total trade is stay around 52% for the whole period and the growth rate of imports is stay around 47%. Within this group, Malaysia is the countries which has highest share of export and import.

Figure 2.15 Export and Import: middle income countries, 1990-2008 (Million USD)



Source: International Monetary Fund, 2010

Table 2.8 Major trade partner: middle income countries, 1990-2008 (%)

China				India			
Export		Import		Export		Import	
United States	19.95	Japan	15.29	United States	15.64	China	8.22
Hong Kong	15.70	Korea	10.67	UAE.	9.04	United States	6.80
Japan	10.59	United States	7.85	China	5.47	Saudi Arabia	4.61
Korea	4.75	Germany	5.02	United Kingdom	4.44	UAE.	4.43
Germany	4.04	Malaysia	2.99	Hong Kong	4.27	Switzerland	4.23
Netherlands	3.18	Australia	2.51	Singapore	4.18	Germany	3.91
United Kingdom	2.52	Russia	2.29	Germany	3.53	Australia	3.10
Singapore	2.27	Thailand	2.18	Belgium	2.78	Belgium	3.09
Russia	1.83	Singapore	2.15	Japan	2.57	Singapore	2.85
Italy	1.66	Hong Kong	1.92	Italy	2.55	United Kingdom	2.84
Others	33.51	Others	47.11	Others	45.53	Others	55.91

Indonesia				Malaysia			
Export		Import		Export		Import	
Japan	21.48	Singapore	14.56	United States	17.80	Japan	15.40
United States	11.51	Japan	11.84	Singapore	15.68	United States	13.48
Singapore	9.22	China	9.98	Japan	10.44	Singapore	11.86
Korea	7.08	United States	7.20	China	6.97	China	10.19
China	7.05	Malaysia	5.36	Hong Kong	5.13	Thailand	5.03
Malaysia	4.05	Korea	5.08	Thailand	4.71	Korea	4.94
India	3.46	Thailand	4.99	Netherlands	3.67	Germany	4.24
Australia	2.88	Saudi Arabia	4.37	Korea	3.52	Indonesia	3.82
Netherlands	2.62	Australia	4.33	Australia	3.03	Hong Kong	2.71
Thailand	2.46	Germany	3.01	India	2.79	Philippines	2.42
Others	28.18	Others	29.28	Others	26.28	Others	25.92

Source: CEIC Database

Table 2.8 Major trade partner: middle income countries, 1990-2008 (%) (Cont.)

Philippines				Thailand			
Export		Import		Export		Import	
United States	20.69	United States	17.25	United States	15.46	Japan	21.47
Japan	16.15	Japan	16.20	Japan	13.14	China	9.44
Netherlands	8.71	Singapore	8.31	China	7.80	United States	8.05
Hong Kong	8.09	Korea	6.17	Singapore	6.89	Malaysia	5.97
China	7.45	China	5.68	Hong Kong	5.45	Singapore	4.45
Singapore	6.73	Saudi Arabia	4.82	Malaysia	5.02	UAE.	4.42
Malaysia	4.93	Hong Kong	3.96	Indonesia	2.97	Korea	3.72
Germany	3.90	Malaysia	3.95	United Kingdom	2.78	Saudi Arabia	3.02
Korea	3.54	Thailand	3.69	Netherlands	2.63	Germany	2.95
Thailand	3.07	Germany	2.33	Vietnam	2.11	Indonesia	2.62
Others	16.73	Others	27.65	Others	35.76	Others	33.89

Source: CEIC Database

The major trade partner of middle income countries are showed in table 2.8. In most countries, the major trade partners are China, United Stated, and Japan.

2.3.3 Foreign direct investment

From figure 2.16, inflows to the two largest economies, China and India, especially in china which has obviously higher degree of FDI inflow compare to other countries in this group. In Malaysia and Thailand FDI inflows fell slightly. And despite the crisis, Indonesia can maintain growth in FDI.

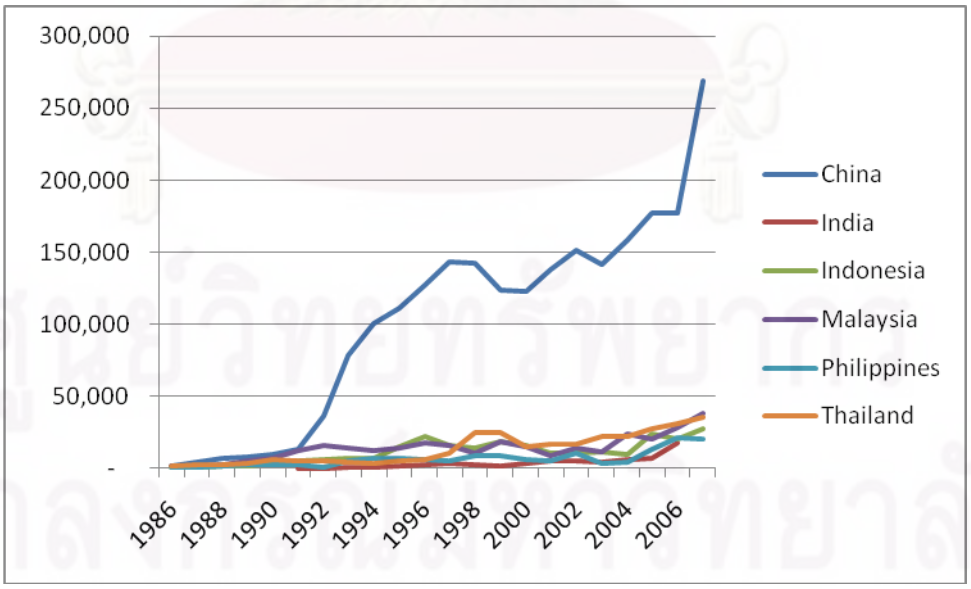
In China, the pattern of inflows changed dramatically from a surge in the first half of 2008 to a sharp decline in the second half. From January to June, the influx of “hot

money" was one of the factors that caused inflows to rise sharply but they slowed down after July, and especially in the fourth quarter, due to the evolving global financial crisis and the deteriorating world economic situation.

In India, in recent years, leading TNCs in many manufacturing and service industries have speeded up their market entry and expansion in India. Accordingly, FDI flows to the country in 2008 surged, continuing the trend of the previous two years.

In Malaysia and Thailand, FDI inflows dropped by 4% and 10% respectively. While a number of other countries in the sub region such as Indonesia and Vietnam were successful in attracting greater FDI inflows to promote their economic development. In Indonesia, FDI inflows rose about 14% in 2008, reaching around $8 billion.

Figure 2.16 Foreign Direct Investments in middle income countries, 1990-2008 (Million USD)



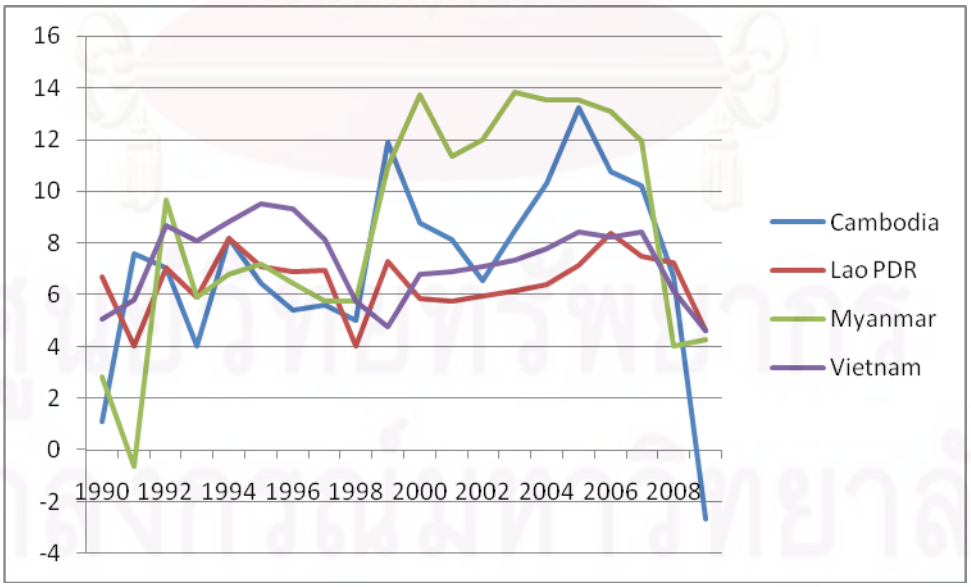
Source: UNCTAD, World Investment Report

2.4 Economic Conditions in Low income countries (Cambodia, Laos, Myanmar, and Vietnam)

2.4.1 Economic Growth

In low income countries including Cambodia, Laos, Myanmar, and Vietnam, Before 1997, Vietnam is the country which has the highest growth rate but, today, Myanmar is the country which has the highest growth rate compare to other countries, and follow by Cambodia. However, the value of GDP in Vietnam is highest in this group. Due to the low linkage in financial markets, even Asian financial crisis in 1997-1998, it not effect GDP growth of most countries except Vietnam. Recently, because of the world economic recession, their economic growth rates declined again and the growth rates become negative in cambodia.

Figure 2.17 GDP growths in low income countries, 1990-2008



Source: International Monetary Fund, 2010

Table 2.9 GDP in low income countries, 1990-2008 (Billion USD)

	Cambodia	Lao PDR	Myanmar	Vietnam
1986	0.01	0.02	0.39	0.12
1987	0.00	0.02	0.61	0.61
1988	0.01	0.02	0.85	1.38
1989	0.01	0.04	2.12	0.87
1990	0.09	0.07	0.35	1.27
1991	0.43	0.10	0.37	2.60
1992	0.91	0.12	0.51	4.45
1993	1.88	0.14	0.79	6.98
1994	2.11	0.18	1.21	10.09
1995	2.91	0.25	1.95	15.08
1996	3.08	0.30	2.17	19.47
1997	3.12	0.33	2.73	22.60
1998	3.15	0.45	5.14	24.91
1999	3.62	1.18	8.28	27.76
2000	3.65	1.74	8.91	31.18
2001	4.09	1.92	8.09	33.16
2002	4.43	2.20	11.97	37.20
2003	4.90	2.99	22.28	44.73
2004	5.88	3.85	23.30	55.59
2005	7.36	4.38	31.50	70.03
2006	8.89	6.42	46.23	86.48
2007	11.34	8.10	75.20	109.24
2008	17.89	10.86	123.05	167.92

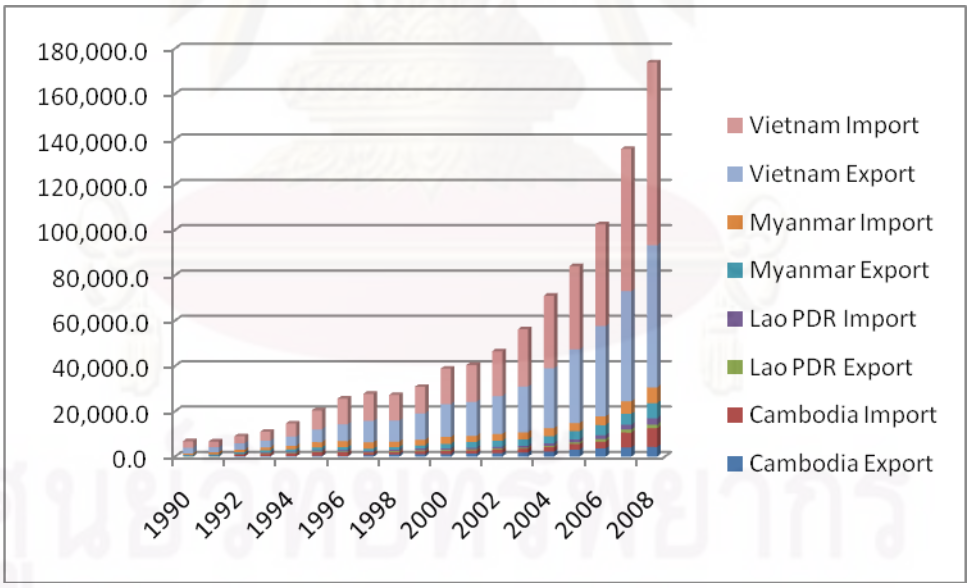
Source: International Monetary Fund, 2010

2.4.2 International trade

Figure 2.18 shows that in that the international trade of low income countries has increased significantly since 1990. Total trade of this group grew from $75 billion in 1990 to $200 billion in 2008, which is up about 3 times compared to 1990. The average of total trade from 1990-2000 is about 50 billion USD and about 120 billion USD in 2001-2008. The total value and growth rate in each period is quite high. The average growth rate in this group is 6% during 1991-2000 and become 17% during 2000-2008.

The share of exports in total trade is stay around 25% for the whole period and the growth rate of imports is stay around 75%. Within this group, Malaysia is the countries which has highest share of export and import.

Figure 2.18 Export and Import: low income countries, 1990-2008 (Million USD)



Source: International Monetary Fund, 2010

The major trade partner of each country is showed in table 2.10. For most countries, the major trade partners are Thailand.

Table 2.10 Major trade partner: low income countries, 1990-2008 (%)

Cambodia				Lao			
Export		Import		Export		Import	
United States	57.73	Thailand	20.35	Thailand	30.50	Thailand	65.81
Germany	7.73	China	14.26	Vietnam	14.69	China	9.83
United Kingdom	6.06	Hong Kong	13.60	China	4.68	Vietnam	6.90
Hong Kong	4.99	Vietnam	13.12	France	4.21	Singapore	2.66
Canada	3.40	Singapore	7.81	Germany	3.92	Japan	2.04
Vietnam	2.88	Korea	4.65	United Kingdom	2.56	Korea	1.65
Singapore	2.21	Japan	2.99	Korea	1.91	Germany	1.13
France	1.86	Indonesia	2.83	Belgium	1.88	Australia	1.11
Japan	1.85	Malaysia	2.82	Netherlands	1.42	France	1.05
Spain	1.84	France	2.05	United States	1.36	Hong Kong	0.86
Others	9.44	Others	15.52	Others	32.85	Others	6.95

Myanmar				Vietnam			
Export		Import		Export		Import	
Thailand	40.01	China	29.26	United States	17.72	China	16.34
India	12.22	Thailand	18.64	Japan	13.82	Singapore	12.57
China	6.39	Singapore	18.45	China	8.65	Korea	9.53
Japan	4.74	Malaysia	5.91	Australia	7.76	Japan	8.53
United States	4.60	Korea	5.58	Singapore	5.07	Thailand	5.92
Malaysia	2.73	Japan	4.02	Germany	3.82	Malaysia	3.38
Germany	2.68	Indonesia	3.19	United Kingdom	3.09	Hong Kong	3.37
Singapore	2.24	India	3.10	Malaysia	2.88	United States	2.90
United Kingdom	2.04	Hong Kong	1.49	Korea	2.48	Indonesia	2.10
Korea	1.49	Germany	0.92	Netherlands	2.34	Germany	2.07
Others	20.85	Others	9.44	Others	32.37	Others	33.29

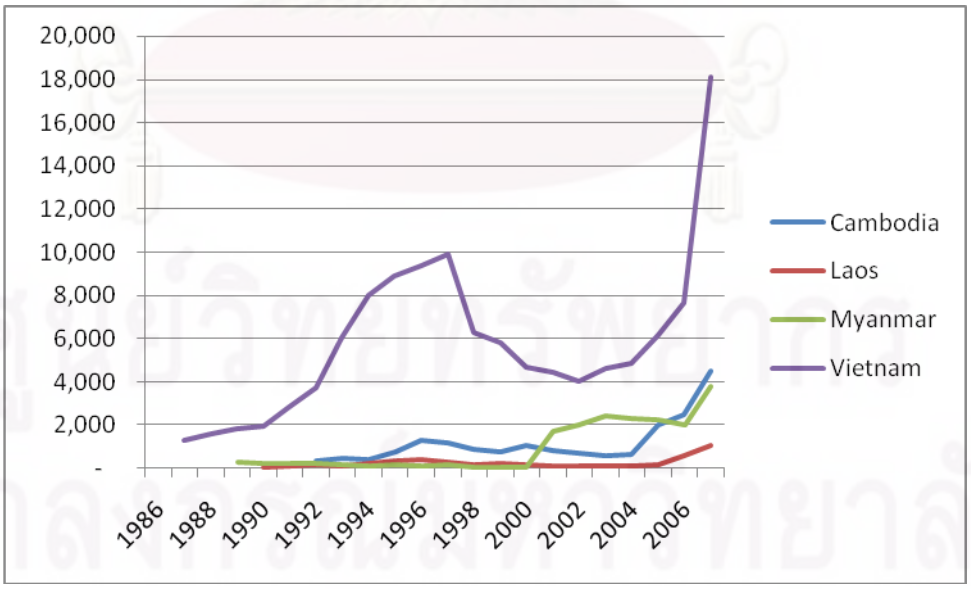
Source: CEIC Database

2.4.3 Foreign Direct Investment

Figure 2.19 shows the overall trend of FDI inflows in low income Countries. Overall of FDI inflow is increasing slightly during 2000-2006 except Vietnam. In Vietnam, FDI increase dramatically during 1990-1996. However because of crisis in 1997, FDI deeply declined in 1997-2002 and recover again after that.

In Vietnam, FDI inflows to the country totaled a record $8 billion, up nearly 20% from last year, and there has been no sign of a weakening in the first half of 2009. In UNCTAD's World Investment Prospects Survey 2009, Viet Nam ranked 11th among the most preferred investment locations for foreign investors in 2009, down from 6th position in the previous survey, perhaps due to high inflation and macroeconomic instability. Nevertheless, the country continues to attract record foreign investments, suggesting that investors are still confident in its long-term growth prospects. Viet Nam is becoming an increasingly attractive location for FDI in labor intensive manufacturing and other activities.

Figure 2.19 Foreign Direct Investments in low income countries, 1990-2008 (Million USD)



Source: UNCTAD, World Investment Report

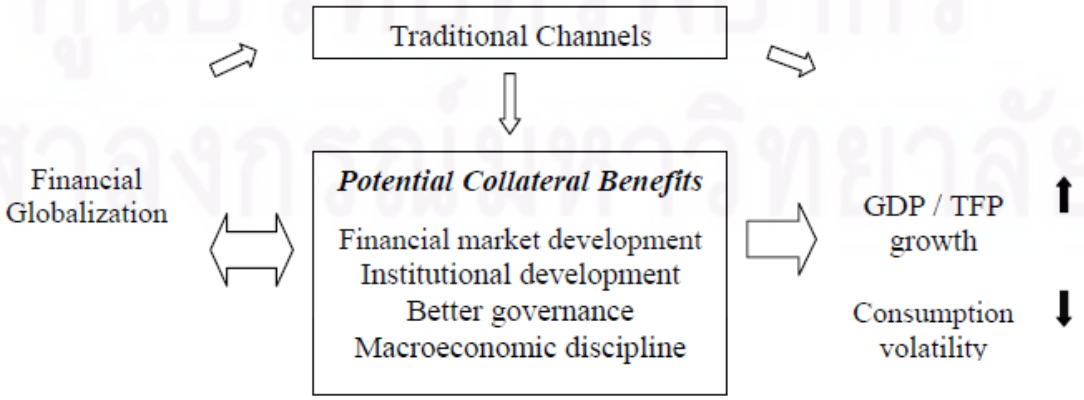
CHAPTER III
REVIEW OF LITERATURE

As financial integration is an interesting issue, there are a number of studies of this topic dispersed among many fields.

Kose (2006) gives the conceptual framework of financial integration that in the traditional views, capital flows could directly increase GDP growth and reduce consumption volatility. However, in addition to the traditional channels, the growth and stability benefits of financial globalization are also realized through a broad set of "collateral benefits" (see Figure 3.1-3.2). These collateral benefits affect growth and stability dynamics indirectly. In this view, the role of financial globalization may be more important in increasing GDP, TFP growth and reducing consumption volatility.

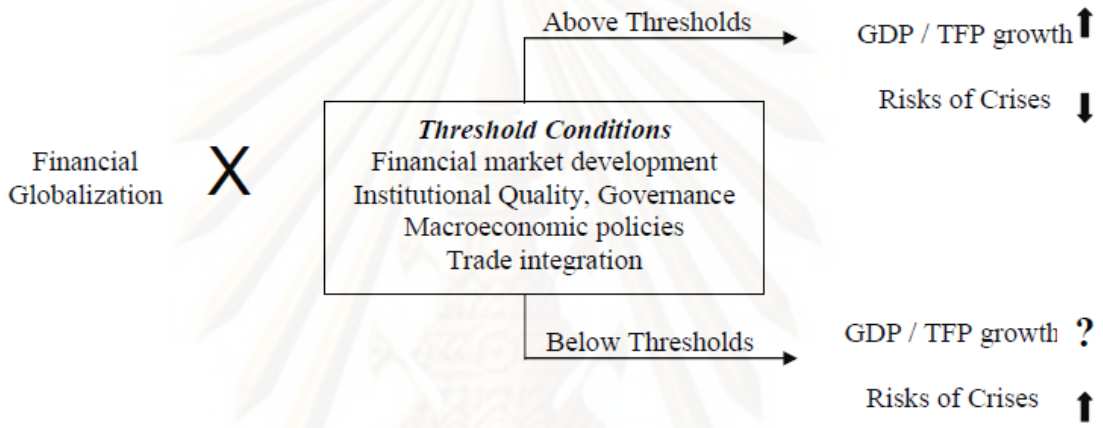
Figure 3.1 The traditional view of impact of financial globalization

Figure 3.2 Different perspective of impact of financial globalization



Moreover, the frameworks of financial integration conclude that there are threshold effects that play important roles in shaping the macroeconomic outcomes of financial globalization. Countries meeting these threshold conditions are better able to reap the growth and stability benefits of financial globalization.

Figure 3.3 Threshold effects in impact of financial globalization



Therefore, the main issues in studying the impact of financial integration is classify into three topics: economic growth, economic stability, and threshold conditions effects. In this chapter, we begin with a very brief review of the basic implications from theoretical models about how financial integration should affect growth, volatility, co-movement of output and consumption, and effects of financial integration in various threshold conditions.

3.1 Impact of Financial Integration

3.1.1 Measuring financial integration

Measuring international financial integration can be broadly grouped into three classes: regulatory measures, quantity-based measures, and price-based measures. The extent of regulations on various types of capital flows indicates potentiality or limitation of integration stipulated by the rules and regulations of each country. The less restrictive these regulations are, the more feasible capital may flow across borders. Quantity-based measures are concerned with the volume of capital flows that actually take place, and the amount of capital that flows across borders is one indication of the degree of financial integration in the region. Furthermore, the more capital flows between markets, the more liquid these markets become. With liquid capital markets, it is increasingly likely that arbitrage should work. As a result, prices should move together more uniformly or in some instances converge by the law of one price. Thus, a number of price variables are useful in assessing the degree of financial integration. In the three subsections that follow, various measures will be examined. The main finding is that East Asia is more integrated with the global financial system rather than with itself.

– Regulatory Measures

One way to assess the degree of financial integration is to examine existing barriers to capital movement. Most empirical analyses that require a measure of capital account restrictions use an index constructed from data in the International Monetary Fund's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER). This is a rule-based indicator in that it focuses on de jure restrictions imposed by the legal authorities in each country. The index uses data on different restrictions: capital market securities, money market instruments, collective investment securities, derivatives and other instruments, commercial credits, financial credits, guarantees, securities, and financial backup facilities, direct investment, real estate

transactions, and personal capital transactions. A corresponding dummy variable takes the value of 1 if each of the restrictions is present in each country, zero otherwise.

— Price-based Measures

The price based measures measure discrepancies in prices or returns on assets caused by the geographic origin of the assets, which constitutes a check of the law of one price. If financial integration is complete, homogeneous assets should have the same price irrespective of the location of trading. However, in reality, assets don't have sufficiently similar characteristics, and we need to take into account differences in systematic risk factors and other important characteristics.

As specific measures, much work has utilized interest rate parity condition, covered interest rate parity (CIP), uncovered interest rate parity (UIP) and real interest rate parity (RIP), to test for the degree of financial market integration. CIP indicates that the difference between the spot rate and the forward rate will be equivalent to the interest rate differential between domestic and foreign interest rates. A violation of CIP suggests the existence of a country premium, i.e. capital controls or transactions that restrict capital movement. UIP not only measures a country premium but also allows for an exchange rate risk premium as impediment to integration. RIP implies that real interest rates are equalized across countries if financial market is integrated. There is a broad consensus that while country premium has become smaller or disappeared over time, currency premium including exchange rate risk premium is still prevalent and UIP and RIP are often violated even in developed financial markets.

The literature on stock market integration also uses the measurement of the influence of foreign stock markets on domestic stock market. It says that as financial markets are more integrated, market movements are more associated with each other and the influence of foreign markets on the domestic markets should grow higher. Given these considerations, a simple specific measure is to examine cross-market correlations and regional interdependence. A more systematic empirical implementation directly

estimates the explanatory power of foreign stock market returns on the domestic stock market return.

— Quantity-based Measures

A perennial problem with using price based measures is to use interest rate data comparable across countries. However, these data are often unavailable and the application of price-based measures may be limited. Given these concerns, much work has explored quantity based measures of financial integration.

The simplest quantity based measure is to look at net capital flows from a country to another. If financial markets are integrated, private capital can move essentially without restriction and there will be huge cross border transactions in financial assets. The basic evidence for this measure would be:

- Capital Inflows/GDP: Capital inflows to GDP are the sum of flows of FDI, equity portfolio, financial derivatives, and debt from the IMF, International Financial Statistics (IFS).

- Inflows of Foreign Direct Investment/GDP, Net: Using net inflows of FDI as a percentage of GDP emphasizes the potential benefits derived from FDI associated with technological transfers, knowledge spillovers, and linkages that go beyond the capital foreign firms might bring into a country.

- Stock of Foreign Liabilities/GDP: the stock of foreign liabilities proxies the thickness of banking and equity relationships (both FDI and portfolio investment) with other countries. This variable thus captures the effects of existing foreign capital relations on current entrepreneurial activity.

- Gross Capital Flows/GDP: Gross private capital flows to GDP are the sum of the absolute values of direct, portfolio, and other investment inflows and outflows recorded in the balance of payments financial

account, excluding changes in the assets and liabilities of monetary authorities and general government. The indicator is calculated as a ratio to GDP in U.S. dollars. The trade literature frequently uses the sum of exports and imports to GDP as a measure of openness. Similarly, gross capital flows to GDP capture a country's overall foreign capital activity.

And the following measures are also used in the robustness evidence.

- Equity Inflows/GDP: We use this variable to assess the relation between entrepreneurial activity and equity flows of capital (sum of foreign direct investment and portfolio inflows from IFS, IMF).
- Net Capital Flows/GDP: Net flows to GDP allow us to focus on the net capital available to the economy. Net flows are the sum of flows of foreign claims on domestic capital (change in liabilities) and flows of domestic claims on foreign capital (change in assets) in a given year.

Another widely used quantity-based measure of financial integration is the correlation between national savings and investment rates, pioneered by Feldstein and Horioka (1980). They argued that for a closed economy, the balance of payments is zero by definition and consequently, investment and savings are equal. On the other hand, if international financial markets are well integrated, the correlation between the two should be low because investment can be financed by foreign capital flows.

In next section, we review macroeconomic evidence on the effects of financial globalization in the three dimensions discussed in the theoretical overview—growth, volatility and co-movement.

3.2 Financial integration and economic growth

3.2.1 Direct channels

As we have already noted, the simplest benchmark one-sector neoclassical framework suggests that financial globalization should lead to flows of capital from capital-rich economies to capital-poor economies since, in the latter; the returns to capital should be higher (Lucas, 1990). These flows should complement limited domestic saving in capital-poor economies and, by reducing the cost of capital, allow for increased investment. Certain types of financial flows could also generate technology spillovers and serve as a conduit for imbibing managerial and other forms of organizational expertise from more advanced economies.

3.2.2 Indirect channels

There are also a number of indirect channels through which financial globalization could enhance growth. It could help promote specialization by allowing for sharing of income risk, which could in turn increase productivity and growth as well[3]. Financial flows could foster development of the domestic financial sector and, by imposing discipline on macroeconomic policies, lead to more stable policies.

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[3] Concerns about increases in volatility that may result from a specialized production structure could discourage countries from taking up growth-enhancing specialization activities; higher volatility might also reduce investment rates. Financial globalization could facilitate international risk sharing and thereby reduce countries' consumption volatility. Among developed countries and across regions within developed countries, better risk sharing appears to be associated with greater specialization (Acemoglu and Zilibotti, 1997; Obstfeld, 1994; and Kalemi-Ozcan, Sorensen, and Yosha, 2001).

In growth theory, the evolution of the financial services sector as a whole represents only one determinant of country-specific differences in growth processes. Nevertheless, the financial sector appears to have special importance in two ways.

First, the financial sector has the function to canalize savings into investment and innovation activities. Second, it is possible to interpret the degree to which the financial sector is developed as a measure of something like broad macroeconomic efficiency. Thus financial development influences total factor productivity and the long-run growth rate. These two characterizations of the financial sector as a determinant of economic growth already reflect the competing approaches of the neoclassical and the endogenous growth theory. In neoclassical growth theory only increases in the level of macroeconomic efficiency are responsible for a permanent growth of per capita income, which is attained by presuming an exogenous productivity growth rate. An increase, for example, of the saving rate induces a growth effect that is only transitory. Endogenous growth models, by contrast, permit also the possibility of a permanent increase in the growth rate of per capita income through an increase of the macroeconomic savings rate or through research and development activities. However, the endogenous growth approaches are not able to explain the convergence dynamics, that can be discovered empirically and constitute a special characterization of neoclassical models.

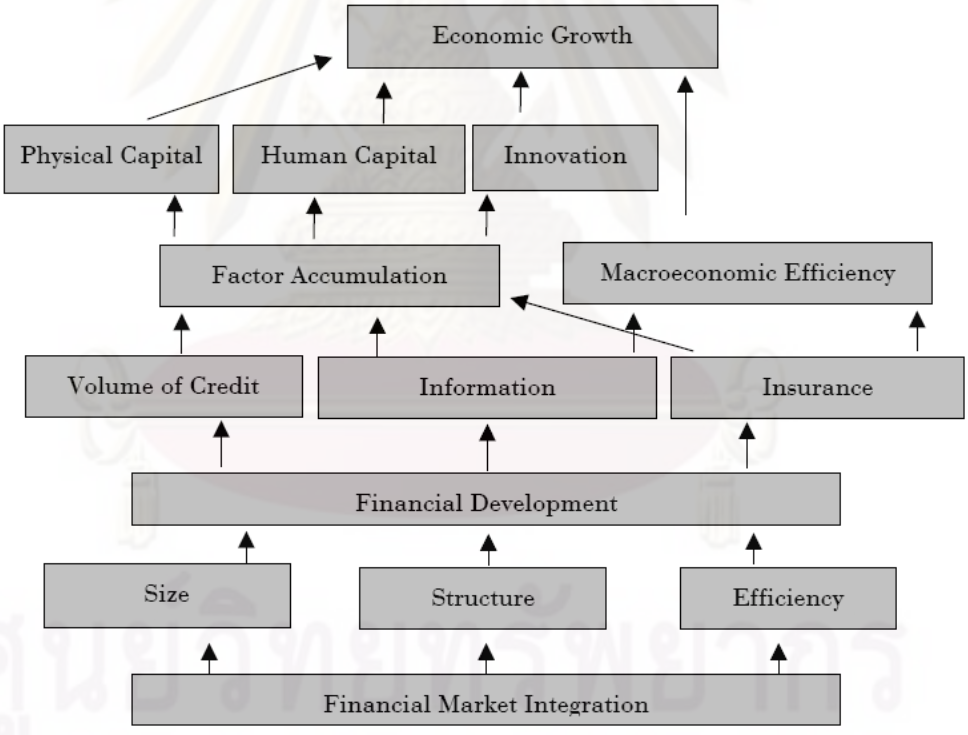
In both neoclassical and endogenous models the long-run economic development of per-capita income is basically driven by two factors: the accumulation of input factors and the change in the macroeconomic efficiency in allocating these input factors. The change in macroeconomic efficiency is often described as the growth of total factor productivity.

The degree of financial development can be measured in terms of different components, namely the size, the structure and the efficiency of the financial sector. This characterization is shown in figure 3.4. Indicators that measure the size of the financial sector basically include information about the depth of financial intermediation. With the help of structural indicators we can obtain information about the allocation of resources and the relevance of an economy's different financial institutions, e.g. the

impact of private and state-owned banks. Using efficiency indicators the level of transaction cost, the degree of information asymmetries and in particular the competition environment can be recorded. As figure 3.4 reveals, each of the different measures of the degree to which the financial sector is developed can be influenced by financial market integration.

Following figure 3.4 (Carkovic, 2006), the financial sector affects both driving forces of growth, factor accumulation and efficiency of allocation. Literature has identified different channels making up the link between the financial sector and economic growth as follow:

Figure 3.4 Economic growth, financial development and financial integration



— Supply of credits for investment

A developed, competitive financial sector ensures relatively small deviations between lending and deposits interest rates, which in turn enlarges that part of macroeconomic savings that can be transformed into credits for investment projects of the non-banking sector. According to the analysis of Mckinnon (1973) and Shaw (1973) a functioning financial sector ensures high private saving rates due to an attractive interest rate, high private savings facilitate investment activities of private firms, and it enables an economy to grow at a high speed. This saving rate effect is intensified when the growth dynamics are also driven by human capital accumulation. Hence, the financial sector can raise the formation of human capital through the provision of credit to private households which use such financial means for private education investments.

— Provision of information

In economic theory the task of the financial sector should be, among other things, to channel savings into the most profitable investment projects. A developed financial sector facilitates this if banks and insurance companies monitor investment projects and provide information about potentially innovative enterprises to their customers.

— Insurance of risks

Since more profitable investment projects are usually associated with higher risks, improving the possibilities to insure oneself against these risks can significantly increase investments financed by given savings. This insurance function is the more important the more economic growth is driven by technological innovations that are linked to high sunk costs. Through spillover-effects R&D drives the technological knowledge stock of an economy which in turn increases total factor productivity.

Following economic theory, the growth rate of a country is basically driven by factor accumulation and improvements in macroeconomic efficiency, i.e. growth of total factor productivity. A functioning financial sector is in part responsible for the accumulation of input factors as well as for the efficiency with which the input factors can be used. The degree of the financial sector's development can be measured in terms of its size, structure and efficiency. Each of these different financial measures can be influenced by financial market integration. Therefore, an increase in the degree of financial market integration that results in a rise in the financial sector's development level enables a shift in the growth rate of per-capita income.

There are a number of empirical studies tried to systematically examine whether financial integration contributes to growth using various approaches. For example, in an influential paper, Rodrik (1998) finds that capital account liberalization has no significant effect on economic growth. His analysis is based on a binary measure of the existence (or lack thereof) of capital controls. Employing a finer and presumably more informative version of the same openness measure, Quinn (1997) documents a positive association between capital account liberalization and economic growth. As discussed by Edison, Klein, Ricci, and Slok (2004), empirical studies using finer (more informative) de jure measures of capital account openness appear to reach more positive results about the impact of financial integration on economic growth than those that employ binary de jure.

Why do different studies reach such diverse conclusions about the importance of financial integration in affecting long-run economic performance? A key issue is related to the measurement of financial integration. Some widely used de jure measures are quite coarse and may not capture the true extent of international financial integration.

Among the studies that use both de jure and de facto measures, specifications where capital account openness is measured using de facto measures tend to lend more support for the potential growth enhancing effects of financial integration than

those employing de jure measures (Kraay, 1998; O' Donnell, 2001; Edison, Levine, Ricci, and Slok, 2002; and Garcia and Santana, 2004).

There are also materially important differences in the coverage of countries across studies. Some studies exclusively focus on advanced countries, some consider developing and emerging market countries, and others use a combination of all three groups. While Quinn (1997) and Garcia and Santana (2004) find that capital account liberalization tends to have a positive impact in all countries, Edwards (2001) and Edison, Klein, Ricci, and Slok (2004) argue that its effect is very limited in less developed countries. Arteta, Eichengreen and Wyplosz (2001), on the other hand, find no relationship between the level of development and the growth effects of capital account liberalization.

The time period covered by different empirical analyses is another source of variation in results. Some studies use data going back to the early 1950s (Alesina, Grilli, and Milesi-Ferretti, 1994), while others limit their examination to the post-1986 period (Klein and Olivei, 2001). Longer time spans are presumably more appropriate for studying the impact of international financial integration on economic growth. At the same time, one must be cognizant of the fact that capital flows to developing countries have really taken off only in the last two decades. The choice of sample period appears to make a big difference. For example, comparing the studies by Rodrik (1998) and Quinn (1997) which arrive at diametrically opposed conclusions, Eichengreen (2002) observes that Quinn's sample coverage begins in 1960 and Rodrik's in 1975. Even though both studies use a sample ending in 1989, the impact of the debt crises of the 1980s receives a higher weight in Rodrik's study since the span of his dataset is much shorter.

There are also differences in empirical methodologies that could account for some of the variations in results across papers, especially given the large number of potential pitfalls in reduced-form cross-country regressions. Edison, Levine, Ricci, and Slok (2002) claim that they employ a variety of statistical methodologies that allow them

to deal with several econometric problems, including possible reverse causality—i.e., the possibility that any observed association between financial integration and growth could result from the mechanism that faster growing economies also more likely to choose to liberalize their capital accounts. After a battery of statistical analyses, they conclude that, overall, there is no robustly significant effect of financial integration on economic growth.

Table 3.1 summarizes recent studies on this subject. Three out of the fourteen papers report a positive effect of financial integration on growth. However, the majority of the papers tend to find no effect or a mixed effect for developing countries. This suggests that, if financial integration has a positive effect on growth, it is probably not strong or robust.

Table 3.1 Summary of Recent Research on Financial Integration and Economic Growth

	Number of Countries	Period	Effect on Growth
Alesina, Grilli, and Milesi-Ferretti (1994)	20	1950-89	No effect
Grilli and Milesi-Ferretti (1995)	61	1966-89	No effect
Quinn (1997)	58	1975-89	Positive
Kraay (1998)	117	1985-97	Mixed
Rodrik (1998)	95	1975-89	No effect
Klein and Olivei (2000)	92	1986-95	Positive
Chanda (2001)	116	1976-95	Mixed
Atteta, Eichengreen, and Wyplosz (2001)	59	1973-92	Mixed
Bekaert, Harvey, and LundBlad (2001)	30	1981-97	Positive
Edwards (2001)	62	1980-90	No effect
O'Donnell (2001)	94	1971-94	Mixed
Reisen and Soto (2001)	44	1986-97	Mixed
Edison, Klien, Ricci, and Slok (2002)	89	1973-95	Mixed
Edison, Levine, Ricci, and Slok (2002)	57	1980-2000	No effect

3.3 Financial integration and macroeconomic volatility

3.3.1 Economic Volatility

The effects of financial integration on output volatility are not obvious in theory. In principle, financial integration allows capital-poor countries to diversify away from their narrow production bases that are often agricultural or natural resource-dependent. This should reduce macroeconomic volatility. At a more advanced stage of development, however, trade and financial integration could simultaneously allow for enhanced specialization based on comparative advantage considerations. This could make countries more vulnerable to industry-specific shocks.[4]

Theory does have a strong prediction about the relationship between financial integration and consumption volatility. Since consumers and economies are risk-averse, consumption theory tells us that they should desire to use financial markets to insure against income risk, thereby smoothing the effects of temporary idiosyncratic fluctuations in income growth on consumption growth. In theory, the benefits of international risk-sharing could be quite large (Lewis, 1999; Wincoop, 1999).

Since the mid-1980s, there has been a well-documented trend decline in macroeconomic volatility in most of the major industrial economies (Doyle and Faust, 2005). Output volatility seems to have been on a declining trend in emerging market and developing economies as well. However, the existing evidence based on papers

[4] The relationship between financial openness and macroeconomic volatility could also be affected by certain features of developing countries that may make them more vulnerable to external shocks. First, the limited diversification of their exports and imports could make them susceptible to terms of trade and foreign demand shocks (Kose, 2002). Second, sharp changes in world interest rates might induce large fluctuations in highly indebted countries (Blankenau, Kose, and Yi, 2001; Neumeyer and Perri, 2005). Third, country size is an important factor as external shocks have a larger impact on volatility in small open developing countries (Crucini, 1997).

using a variety of regression models, different country samples and time periods leads to the conclusion that there is no systematic empirical relationship between financial openness and output volatility, which is, in a sense, consistent with the predictions of theory (Razin and Rose, 1994; Easterly, Islam, and Stiglitz, 2001; and Buch, Dopke, and Pierdzioch, 2005).

Kose, Prasad, and Terrones (2003) confirm the major trends in the evolution of volatility dynamics reported in earlier studies, but also find that, during the 1990s, average declines in output growth volatility were smaller for emerging markets than for either industrial or low income developing economies. More importantly, they find that the ratio of consumption growth volatility to income growth volatility increased during the recent period of globalization for emerging market economies.

What is surprising is not just that the volatility of consumption rose (perhaps because of crises experienced by some of these economies, and the associated rise in income volatility) but that it increased by more than income volatility. This is a striking result in that it runs exactly counter to one of the presumed theoretical benefits of financial integration—that it allows countries to share income risk and smooth consumption.[5]

These authors also find that the relative volatility of consumption growth increases with the degree of financial openness, but only up to a certain threshold level of integration. At higher levels of financial integration, countries do seem to accrue the benefits of financial integration in terms of improved risk sharing and better consumption

[5] A number of recent theoretical papers have attempted to explain the positive association between financial integration and the relative volatility of consumption growth documented by Kose, Prasad, and Terrones (2003). For instance, Levchenko (2004) and Leblebicioglu (2006) consider dynamic general equilibrium models where only some agents have access to international financial markets. In both models, capital account liberalization leads to an increase in the volatility of aggregate consumption since agents with access to international financial markets stop participating in risksharing arrangements with those who do not have such access.

smoothing relative to autarky. Most emerging market economies are, however, below this threshold level of financial integration while most industrial economies are above it.[6]

3.3.2 Financial Crisis

Financial integration or capital account liberalization is also believed to have played an important role in fomenting financial crises and has been indicted by some observers as the proximate cause for the crises experienced by various emerging markets over the last decades. Interestingly, there is little empirical evidence to support the view that capital account liberalization by itself increases vulnerability to crises. While crisis episodes receive most of the attention, however, they are just particularly sharp manifestations of the more general phenomenon of macroeconomic volatility.

Some papers that have analyzed the effects of capital controls on susceptibility to financial crises have found that countries with capital controls are in fact more subject to crises. But this could simply be because of countries with poor macroeconomic fundamentals that put controls in place to try and insulate themselves from crises. Glick, Guo, and Hutchison (2006) find that capital account openness reduces the probability of currency crises, even after controlling for selection bias in terms of how macroeconomic policies influence the existence of capital controls. The relationship between capital controls and crises could also reflect the fact that some of the countries are actually more integrated in terms of de facto measures of integration (capital flight) and that capital controls therefore do not insulate them from crises.

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[6] Bekaert, Harvey, and Lundblad (2006) find that, following equity market liberalizations, there is a decline in consumption volatility. These results differ from those of Kose, Prasad, and Terrones (2003b) due to differences in the definitions of financial integration, the measures of consumption volatility, data samples, and methodologies. The results in Bekaert, Harvey, and Lundblad (2006) suffer from the same problems noted about their work on the impact of equity market liberalizations on economic growth.

Edwards (2005) examines this issue using a more sophisticated measure of de jure financial openness that attempts to incorporate some notion of the intensity of capital controls. He looks at two manifestations of external crises—sudden stops of capital inflows and current account reversals. He finds no systematic evidence that countries with higher capital mobility tend to have a higher incidence of crises, or tend to face a higher probability of having a crisis, than countries with lower mobility. In subsequent work, Edwards (2006) concludes that there is no evidence that the output costs of currency crises are smaller in countries that restrict capital mobility.

While currency crises have been emphasized in the literature on the risks of capital account liberalization, it is worth noting that banking crises account for about one-third of financial crises over the last three decades and that their frequency increased in the 1980s and 1990s (Kaminsky and Reinhart, 1999). Banking crises tend to be more disruptive. Hutchison and Noy (2005), for instance, find that banking crises generally have larger adverse effects on output growth than currency crises. Glick and Hutchison (2001) explore the relationships between these two types of crises, one of their conclusions is that banking crises are a good indicator of future currency crises, while the reverse is not necessarily true. Furthermore, there appears to be little evidence that capital account liberalization by itself affects vulnerability to banking crises; moreover, the adverse effects of banking crises seem to be weaker for countries with open capital accounts (Bonfiglioli and Mendicino, 2004).

In sum, there is little formal empirical evidence to support the oft-cited claims that financial globalization in and of itself is responsible for the spate of financial crises that the world has seen over the last three decades.

3.4 The effect of financial integration based on the types of capital flows

We now review the literature on this question, studying the impact of each of these types of flows in turn.

3.4.1 Effect of portfolio investment (PI)

The rising importance of portfolio equity flows to emerging markets has motivated a number of researchers to examine the growth effects of equity market liberalizations. Most of the papers in this rapidly expanding literature suggest that portfolio equity flows have a significant positive impact on output growth. Some of these papers also document the empirical relevance of various theoretical channels linking equity market liberalization to economic growth including through increases in investment growth and total factor productivity (TFP) growth.

In 2005, Bekaert, Harvey, and Lundblad document that equity market liberalizations have a positive effect on growth.[7] Using a sample that covers 95 countries over the period 1980–97, they conclude that equity market liberalizations increase GDP growth by about 1 percentage point. Using a longer sample and a different methodology, Li (2003) finds that such liberalizations lead to a 0.6 percentage point increase in GDP growth.

A potential concern related to this work based on cross-country regressions is that many emerging markets undertook equity market liberalizations around the same time that they instituted numerous other policy and structural reforms. Henry (2003) argues that it is not possible to explain the strong result in the study of Bekaert, Harvey, and Lundblad using standard growth accounting techniques as this would require an elasticity of output with respect to capital of about 1. He notes that equity market liberalizations are often part of a larger reform program and that these reforms could

[7] Equity market liberalizations are defined as events that make shares of common stock of local firms available to foreign investors. Commonly-used dates, drawn from Henry (2000) and Bekaert and Harvey (2000), include official liberalization dates and dates of “first sign” of liberalization based on events such as the launching of a country fund or American Depository Receipt (ADR) announcement. ADRs are securities that are traded in the United States but represent underlying stocks listed in a foreign country.

have a positive impact on productivity, leading to an increase in output growth that is compatible with the predictions of standard production theory.

To address these concerns, Bekaert, Harvey, and Lundblad (2005) control for other determinants of growth, including financial development, quality of legal institutions, macroeconomic policies, and broader capital account and trade liberalizations. They find that capital account liberalization has no significant effect on growth. The inclusion of other factors dampens the magnitude of the growth effects of equity market liberalizations but the effect is still statistically significant and in the range of 0.7–0.9 percentage points.[8] Henry (2003), however, finds these sensitivity experiments unconvincing since BHL do not use binary variables to capture the effect of many other one-off reforms, especially trade reforms and inflation stabilizations. Henry argues that, since Bekaert, Harvey, and Lundblad undertake a before-and-after evaluation of the growth effects of equity market liberalizations, they should conduct the same before-and-after event analysis for other reforms as well.

Other macroeconomic evidence on the growth effects of equity market liberalizations is more mixed. Martell and Stulz (2003) note that equity market liberalizations can be seen as country initial public offerings (IPOs) since, like company IPOs, these events make shares in existing firms available to foreign investors. These authors examine country excess returns, defined as excess returns on a dollar-denominated total return index for each country, relative to excess returns of a global portfolio and an emerging markets index. They report that, following equity market liberalizations, country excess returns are high for the first 2–4 years but then turn

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[8] Bekaert, Harvey, and Lundblad also attempt to tackle potential endogeneity between the liberalization decision and growth performance—an issue emphasized by Martell and Stulz (2003). They create a proxy for a country's exogenous growth opportunities, based on a country's industry mix and global growth prospects for each industry (inferred from the price to earnings ratios of global industry portfolios). They find that inclusion of this variable in the regressions, which they argue is an indirect way of controlling for the endogeneity of the liberalization decision, does not affect their main result.

marginally negative over longer horizons. Edison, Klein, Ricci, and Slok (2004) confirm the positive association between equity market liberalization and output growth but find that this result disappears when they introduce a measure of government reputation as a regressor. When they interact the liberalization measure with income, they recover its positive impact on growth in middle income countries.

Recent research also provides some cross-country evidence about the empirical relevance of various channels linking equity market liberalization to economic growth. There is evidence, consistent with the predictions of international asset pricing models, that stock market liberalizations reduce the cost of capital.[9] Using a sample of 12 emerging market countries and an event study approach, Henry (2000) shows that, on average, equity price indexes register a substantial increase in the months preceding equity market liberalizations, implying that these liberalizations are associated with a fall in the cost of equity capital. Bekaert and Harvey (2000) analyze changes in the dividend yield after liberalizations and report that the cost of capital goes down by 5 to 75 basis points.

There is also some evidence that equity market liberalizations promote investment growth. Henry (2000), for instance, finds that, in 9 out of 11 emerging market countries in his sample, growth rates of private investment are larger in the first year after equity market liberalization than they were before liberalization. Moreover, he finds that the mean growth rate of real private investment in the three years immediately following equity market liberalizations is 22 percentage points higher than the sample mean. Alfaro and Hammel (2006) find that equity market liberalizations boost imports of machinery going into domestic equipment investment.

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[9] First, such liberalization could increase the volume of capital inflows, which, in turn, should decrease the domestic risk-free rate. Second, increased risk sharing opportunities between foreign and domestic investors might help to diversify risks, reducing the equity risk premium. Third, as capital flows increase and liquidity in the domestic stock market increases, the equity risk premium could fall further. See Stulz (1999a, 1999b) and Kim and Singal (2000) for additional empirical evidence.

In summary, equity market liberalizations generate positive effects. In addition to the problem that much of this literature is still focused on macroeconomic evidence, virtually all of it is based on de jure measures of equity market liberalization.

3.4.2 Effect of foreign direct investment (FDI)

Foreign direct investment (FDI) is defined as an investment involving a long-term relationship and reflecting a lasting interest and control by a resident entity in one economy (foreign direct investor or parent enterprise) in an enterprise resident in an economy other than that of the foreign direct investor (FDI enterprise or affiliate enterprise or foreign affiliate). FDI implies that the investor exerts a significant degree of influence on the management of the enterprise resident in the other economy. Such investment involves both the initial transaction between the two entities and all subsequent transactions between them and among foreign affiliates, both incorporated and unincorporated. FDI may be undertaken by individuals as well as business entities.

Flows of FDI comprise capital provided (either directly or through other related enterprises) by a foreign direct investor to an FDI enterprise, or capital received from an FDI enterprise by a foreign direct investor. FDI has three components: equity capital, reinvested earnings and intra-company loans.

- Equity capital is the foreign direct investor's purchase of shares of an enterprise in a country other than its own.
- Reinvested earnings comprise the direct investor's share (in proportion to direct equity participation) of earnings not distributed as dividends by affiliates, or earnings not remitted to the direct investor. Such retained profits by affiliates are reinvested.

- Intra-company loans or intra-company debt transactions refer to short- or long-term borrowing and lending of funds between direct investors (parent enterprises) and affiliate enterprises.

FDI stock is the value of the share of their capital and reserves (including retained profits) attributable to the parent enterprise, plus the net indebtedness of affiliates to the parent enterprise.

Foreign Direct Investment can take many forms, depending on the type of investor, the investor's investment objective, and the degree of risk the investor is willing to assume. Anyway, in making direct investments in foreign companies and countries, investors are foregoing the advantage of rapid exit, which investors describe as liquidity.

They are willing to make a longer-term commitment, which involves a higher degree of risk, because they anticipate returns on their investment to exceed the costs implied in the higher risk. FDI usually involves greater amounts of capital than indirect investment (such as through country funds). Combined with the higher degree of commitment and longer investment time horizon (i.e., the length of time investors are willing to risk their capital in anticipation of the expected returns), these types of investment usually bring greater benefits for host countries than indirect investments and, therefore, are the investments that recipient countries are most eager to attract. FDI can take many forms as follow:

- Minority stakes in host-country firms, for example, through the direct purchase of shares on the local stock exchange. These investments are often referred to as passive or portfolio investments, because the investors do not assume control of the firm's operations and may have very little input into how the firm is managed. Minority stakes in foreign firms are often obtained through privatization of state-owned enterprises and debt equity swaps of both private and state-owned firms.

- Licensing agreements with host-country firms. The transnational companies (TNC) may transfer the rights to use a specific technology to a local firm, which would be responsible for production and marketing in the local market. The local firm would pay the TNC for the right to use its technology. This type of arrangement offers the TNC a low-risk way of entering a foreign market. TNCs sometimes acquire shares of local firms with which they enter into licensing agreements.

- Joint ventures are firms that are established and jointly owned by foreign investors in conjunction with local partners, usually private firms, but sometimes state-owned enterprises or even government agencies. Foreign investors may assume minority or majority positions as well as varying degrees of operational control. Combinations of foreign investors sometimes establish joint ventures in host countries to reduce the startup costs of establishing solely owned operations.

  Joint ventures give foreign investors the advantage of a larger presence in the local market, but with less risk than would be involved in the outright purchase of a local firm or the establishment of a wholly owned subsidiary in the host country. Joint ventures are often used by TNCs to enter new markets that are perceived as having great potential, but also as having relatively high risk. They give TNCs a chance to gain firsthand knowledge and experience in local markets as the basis for deciding whether they want to make a full-scale commitment.

- Majority stakes in host-country firms, through share purchases, privatization, debt equity swaps, or other techniques. This option requires a greater level of commitment from the foreign investor as well as a longer time horizon regarding expected returns. TNCs that invest in local firms provide major benefits for the firms and an economic stimulus for host countries as well. Usually, such investments will reflect the TNCs

global production and distribution strategy and, as such, will accelerate the host country's efforts at integration into the global economy.

- Wholly owned subsidiary in the host country. This option represents the highest level of risk and commitment by the TNCs and is usually reserved for the local markets seen as having the greatest profit potential. Major transnational companies usually have large presence, primarily through wholly owned subsidiaries, in the major emerging markets. These operations are usually vital components in their global production and distribution strategies.

As we discussed earlier, the relative importance of FDI flows has risen significantly in recent years, making it the most important form of private international financing for emerging market economies. There is a strong presumption in theory that FDI should yield more benefits than other types of financial flows since, in addition to augmenting domestic capital stock, it has a positive impact on productivity through transfers of technology and managerial expertise. It has also been argued that FDI tends to be the least volatile of the various types of capital flows, making countries less vulnerable to sudden stops or reversals of flows.[10]

In parallel with the rapid growth of FDI flows, a large empirical literature has flourished seeking to find evidence in support of the theoretical benefits of these flows. Although the evidence has in general been mixed, recent studies, using more sophisticated methodologies and micro-level datasets, find more favorable evidence of benefits from FDI. More importantly, the literature has been reasonably successful in

[10] Moreover, FDI could help ease firms' financing constraints. Harrison, Love, and McMillan (2004) document that FDI is associated with a significant reduction in financing constraints, especially in low income countries. Blalock and Gertler (2005) find that FDI could mitigate the adverse effects of financial crises by helping firms maintain continuous access to credit through their parent companies.

identifying the conditions necessary to help developing countries fully utilize the potential benefits of these flows.

3.4.2.1 FDI and growth

About the effect of FDI, there is a strong presumption in theory that FDI should yield more benefits than other types of financial flows since, in addition to augmenting domestic capital stock; it has a positive impact on productivity through transfers of technology and managerial expertise. It has also been argued that FDI tends to be the least volatile of the various types of capital flows, making countries less vulnerable to sudden stops or reversals of flows

There are many empirical studies in studying impact of FDI. Most of them show that FDI can stimulate economic growth through the technology transfer and spillover effect (Wei et al. 2001; Bende-Nabende and Ford 1998). While some papers show that FDI enhances GDP growth, others report that there is no direct evidence of such a relationship.[11]

In 1998, Borenztein use panel data approach to compare the effect of FDI and economic growth among 69 developing countries and he found that FDI can promote economic growth in all countries. But in the study of Bashir (1999) which study the effect of FDI in developing countries by using panel fixed effect model and random effect model, he found that although the coefficient of FDI term is positive sign but it is insignificant, while the coefficient of interaction term between FDI and human capital is positive and significant. Blonigen and Wang (2005) show that inappropriate pooling of data from developed and developing countries could dampen the estimated growth effects of FDI. Since FDI is more likely to crowd in domestic investment in developing

[11] On the former, see Haveman, Lei, and Netz (2001). On the latter, see Carkovic and Levine (2005).

countries than in developed ones, it could have larger effects on growth in the former group. Some empirical studies note that FDI seems to boost growth only in economies that have the right initial conditions, including high levels of human capital, financial sector development and policies fostering free trade.[12]

The growth benefits of FDI also depend on its sectoral composition and its interactions with domestic investment (Aykut and Sayek, 2005). FDI flows into the primary sector may have limited beneficial spillovers, since they often involve mega projects that scarcely employ domestically-produced intermediate goods. FDI in the manufacturing sector, on the other hand, tends to have a significant effect on GDP growth because of stronger linkages between this sector and the rest of the economy.

Carkovic and Levine (2005) provide a comprehensive analysis of the growth effects of FDI. Using panel GMM estimators and a dataset covering the period 1960–1997, they conclude that, after controlling for the joint determination of FDI and growth, FDI has no robust causal effect on economic growth. Melitz (2005) points out that the baseline results of Carkovic and Levine (2005) in fact suggest a positive association between FDI and economic growth, but this positive link disappears when they introduce controls for trade and domestic financial credit. Melitz (2005) notes that there are strong linkages between FDI and trade flows; more importantly, joint changes in FDI and trade flows are correlated with economic growth. He concludes that Carkovic and Levine's results imply that an expansion of FDI flows accompanied by an increase in trade could indeed enhance growth. In 2006, Carkovic use panel data approach in studying 77 developing countries and found that FDI not effect to economic growth. While some empirical studies show that FDI not have impact to economic growth, some studies give difference result. Roy (2006) study the impact of FDI to US economy and

[12] The importance of these three initial conditions is shown by Borensztein, De Gregorio, and Lee (1998); Hermes and Lensink (2003) and Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2006); and Balasubramanyan, Salisu, and Sapsford (1996), respectively. The growth effects of FDI also depend on the complementarity/substitutability between FDI and domestic investment (De Mello, 1999).

his result show that FDI can promote US economy. In china, Zhang (2006) use provincial data with panel fixed effect model and find that FDI can stimulate Chinese economy.

Table 3.2 provides a summary of the literature about FDI. While some papers show that FDI enhances GDP growth, others report that there is no direct evidence of such a relationship.

In summary, despite the theoretical presumption that, of the different types of inflows, FDI has the strongest benefits, it has not proven easy to document these benefits. Recent empirical research that takes a more nuanced approach, especially by accounting for the role of various initial conditions (human capital, trade openness), has been more successful at showing the potential links between FDI and growth.

3.4.2.2 FDI and international trade

In other channels, if we confine our attention to the East Asian economies, robust growth over the past decade has been a result of fast-growing intraregional trade following the evolution of international division of labor—that is, the fragmentation of vertical supply chains according to each country's comparative advantage within production networks. In this instance, cross-border capital flows in the form of direct investment by multinational corporations play a crucial role in furthering intraregional trade.

Table 3.2 Empirical studies of foreign direct investment

Study	Number of Countries / Time Period	Dependent Variable / *Regression Methodology*	Financial Openness Measure	Main Findings
Balasubramanyam, Salisu, and Sapsford (1996)	46 1970–1985	ΔY *Cross section OLS, IV*	FDI/Y	MIXED: FDI has a positive impact on economic growth in countries which have export-oriented rather than import substituting trade policies.
Borensztein, De Gregorio, and Lee (1998)	69 1970–1989	ΔY_c *Cross-section IV; decade panel pooled SUR, IV*	FDI/Y	MIXED: FDI contributes to growth in countries with a higher level of human capital.
De Mello (1999)	31 1970–1990	ΔY, I, ΔTFP *VARs, cointegration; annual panel FE IV, pooled group*	FDI	MIXED: Growth effects of FDI depend on the degree of complementarity and substitution between FDI and domestic investment.
Haveman, Lei, and Netz (2001)	74 1970–1989	ΔY_c *5-yearly panel FE*	FDI/Y	POSITIVE: FDI leads to increased growth.
Lensink and Morrisey (2002)	88 1970–1998	ΔY_c *Cross section OLS, decade panel FE, IV*	FDI/Y	MIXED: FDI has a positive impact on growth, but evidence is weak in developing countries. FDI volatility has a negative growth effect.
Hermes and Lensink (2003)	67 1970–1995	ΔY_c *Cross section OLS, 5-yearly panel FE, RE*	FDI/Y	MIXED: FDI has a positive growth impact if financial system sufficiently developed.
Choe (2003)	80 1971–1995	ΔY_c *5-yearly panel VAR*	FDI/Y	MIXED: FDI Granger-causes economic growth, and vice versa, but effects are more emphasized from growth to FDI than from FDI to growth.
Alfaro, Chanda, Kalemli-Ozcan and Sayek (2004)	71 1975–1995	ΔY_c *Cross section OLS, IV*	FDI/Y	MIXED: FDI has a significantly positive effect on growth in countries with well-developed financial markets.
Carkovic and Levine (2005)	72 1960–1995	ΔY_c *Cross section OLS, 5-yearly panel dynamic system GMM*	FDI/Y	MIXED: FDI inflows do not exert an independent influence on economic growth.
Blonigen and Wang (2005)	69 1970–1989	ΔY_c *10-yearly panel RE, pooled SUR*	FDI/Y	MIXED: FDI has a positive impact on growth in less developed countries provided education levels are high enough, but not in developed countries.
Aykut and Sayek (2005)	37 1990–2002	ΔYc Cross section OLS IV	FDI/Y	MIXED: While manufacturing sector FDI has a positive impact on growth, primary or service sector FDI has no significant impact.

East Asian financial markets provides an impetus to growth include an efficient transfer of funds between net savers and net borrowers within the region; a broadening scope of international risk sharing that will bring down risk premium and cost of capital; and financial deepening in domestic markets that will lead to higher economic growth.

The link between FDI and trade is not straightforward as it appears. FDI may be a trade reducing or trade creating depending on the type of FDI and the underlying motives for trade. Lamberte (2005) explains that a capital-rich country may invest in a relatively capital-scarce, labor-abundant economy in pursuit of low wages. In this case, FDI is largely a substitute for trade in the sense that multinational corporations use FDI to create local production and serve the local economy. However, FDI may create trade if its purpose is to use labor-abundant economies as an export platform. For East Asia in particular, Kawai (2005) argues that FDI has stimulated rather than reduced trade, especially intraindustry trade in manufactured products. FDI from Japan and the newly industrialized economies to China and Southeast Asia has played an important role in the development of regional production networks that have been associated with a high and rising degree of intraregional trade in East Asia.

We discuss three theoretical models regarding the potential effects of inward FDI on the exports of host countries.

— Flying Geese (FG) Model

The term flying geese pattern of development was initially coined by Akamatsu (2003) and introduced into academia in the early 1960 (Lee, 2007). According to the Asian Development Bank (ADB, 2005) labour costs and openness are the essential factors in the FG model. ADB (1999) points out that FDI has shifted from high labour cost home country to the lower labour cost host country. As the lower labour cost host countries develop they become high labour cost nations for a new set of low labour cost host countries (Lee, 2007). The implication of the FG model is that MNE subsidiaries increase the host country's export performance by using the host country's factor

endowments to produce at lower cost. The increased export competitiveness of MNE subsidiaries directly enhances the recipient country's export supply capacity (ADB, 2005). Furthermore, the transfer of FDI also brings new technology, capital equipments and manufacturing expertise into the host countries which are behind in the availability and quality of factor endowment (Kwan, 1996). Therefore, according to the FG model, spillover effects of FDI are likely to stimulate local firms' export ability.

— Product Life Cycle (PLC) Theory

The PLC theory was developed by Vernon (1966) to provide a framework to explain the increasing FDI from US MNEs and its influence on trade flows. There are four stages of production in the PLC theory including innovation, growth, maturity and decline. Vernon observes that, at the first stage of production, US MNEs tend to produce new and innovative products in the US for mainly home consumption without undertaking any FDI, and the rest of the output is exported to serve foreign markets. As products progress to the growth stage and become high in growth and demand, the US MNEs begin to undertake FDI and are inclined to enter into joint venture investment to set up production in other countries. Interestingly, MNEs' production at the growth phase of the product life cycle seeks local markets; in the meantime, foreign competitors start to enter the market (Basu, 1997). Consequently, the demand for exports from the US declines; and the US consumers begin to purchase some of the products from these newly industrialized countries (NICs).

As the production progresses to maturity phase, the problem emerges from cost reduction for the producers. Most FDI, which was initially allocated in advanced countries, is shifted to other lower cost NICs. Apart from the local market consumption, part of the output is exported to serve the US and other foreign markets. Therefore the US and other advanced countries have switched from being exporters to being importers. At the final stage of production, cost-minimizing becomes the major task for the MNEs' production and the allocation of FDI will be the countries having lower and

even the lowest production costs. MNEs' production at the final stage of production serves not only the local market but also the US and the rest of the world.

– New Growth Theory

New growth theory incorporates two important points. Firstly, it views technological progress as a product of economic activity. Secondly, new growth theory suggests that knowledge and technology are characterized by increasing returns, and these increasing returns drive the growth process (Cortright, 2001). Consequently, growth is endogenous in new growth theory rather than exogenous as in old growth theory. Investment in human capital contributes to increasing returns in the production function (Meier and Rauch, 1995), and the more resources devoted to research and development, the faster the rate of innovations and the higher the rate of growth (De Castro, 1998).

According to Shan et al. (19997), the capital accumulation FDI is expected to generate non-convex growth by encouraging the incorporation of new inputs and foreign technologies in the production function of the FDI recipients' countries. In addition, the transfer of advanced technology strengthens the host country's existing stock of knowledge through labour training, skill acquisition, the introduction of alternative management practices and organizational arrangements (De Mello and Sinclair, 1995). As a consequence, FDI increases productivity in the recipient economy, and FDI can be deemed to be a catalyst for domestic investment and technological progress (Shan et al., 1997).

Anyway, the link between FDI and trade is not straightforward as it appears. FDI may be a trade reducing or trade creating depending on the type of FDI and the underlying motives for trade. Based on the standard trade theory, FDI flows from origin country to host country are due to less relative abundance of capital in host country. Therefore, both imports from and exports to origin country are decreased as the comparative advantage that stimulates this trade is suppressed. In the view of trade

substitution, Lamberte (2005) explains that a capital-rich country may invest in a relatively capital-scarce, labor-abundant economy in pursuit of low wages. In this case, FDI is largely a substitute for trade in the sense that multinational corporations use FDI to create local production and serve the local economy. However, FDI may create trade if its purpose is to use labor-abundant economies as an export platform. For East Asia, Kawai (2005) argues that FDI has stimulated rather than reduced trade, especially intra-industry trade in manufactured products. FDI in China and Southeast Asia has played an important role in the development of region that has been associated with a rising degree of intraregional trade in East Asia.

There are many empirical studies which concern about the relationship between FDI and trade. Most studies use panel estimation with gravity model. For example, Eaton and Tamura (1994) analyses the American and Japanese bilateral flows of both FDI and trade with a great number of partners for the period 1985-1990 and uses a modified gravity model with factor endowments. The authors argue that the relationship between outflows investment and exports and the relationship between inflows investment and imports are positive: FDI seems to improve trade. They conclude that FDI induces trade and vice-versa (complementarity relationship). In sectoral level, Fontagné and Pajot (1997) explore relationship between FDI and trade using data for the period 1984-1994 for a panel of 19 French industries. The authors found that FDI flows and French foreign trade are complements. Outward FDI is associated additional exports and imports (trade surplus). Inversely, Inward FDI is associated with trade deficit of the host country.

Zhang (2000) study the relationship between FDI and export China by using panel data at the provincial level in the period of 1986 - 1997. He found that 1% change in the level of FDI in previous year is associated with 0.29% increase in exports in the next year and these results are the most statistically significant. His findings support the belief that increased levels of FDI positively affect provincial manufacturing export performance. In same year, Kishor (2000) investigate the determinants of export performance in India in a simultaneous equation framework using annual data for 1970-1998. He suggests that demand for Indian exports increases when its export prices fall

in relation to world prices. Furthermore, the real appreciation of the rupee adversely affects India's exports. Export supply is positively related to the domestic relative price of exports and higher domestic demand reduces export supply. Foreign investment appears to have statistically no significant impact on export performance although the coefficient of FDI has a positive sign.

In Thailand, Chaipat, Surach, and Pornnapa (2006) examine the role of financial integration in promoting growth and also with the effect on international trade. They use gravity model with annual data covering period 1980-2004 and found that FDI indeed plays a positive role for exports. They conclude that FDI contributes to export growth by providing infrastructure for export production.

Recently, Nathalie, Hitomi, and Alan (2008) examine the relationship between FDI and intraregional trade in East Asia countries by using gravity model with panel estimation. According to their result, FDI is indeed important in explaining the performance of intra-East Asian import and export trade, particularly in the case of trade in components and parts, followed by trade in capital goods.

Table 3.3 provides a summary of the literature about FDI and trade. While most papers show that FDI enhances exports and imports, one report shows that there is no direct evidence of such a relationship.

Table 3.3 Empirical studies of foreign direct investment and trade

	no. of countries, or industries	yeas covered	effect on trade
Eaton and Tamura (1994)	100	1985-1990	positive
Fontagn? and Pajot	19 industries	1984-1994	positive
Kishor, S. (2000)	India	1970-1998	no effect
Zhang, K. (2001)	China, provinces level	1986-1997	positive
Kawai, M. (2005)	15	1980-2002	positive
Chaipat, P., Surach, T. and Pornnapa, L., (2006)	Thailand	1980-2004	positive
Nathalie, A., K. C. Fung, Hitomi, I. and Alan, S., (2008)	14	1986-2003	positive

By using other methodology, CGE model, Ponjai (2001) studied the economic impacts of FDI and TRIMs liberalization on Thai economy. His study aims to construct the Computable General Equilibrium (CGE) model according to the theoretical feature of Chao, and Yu (1998). Chanthasumaetakul (1999) study the impact of foreign direct investment on Trade Balance of Thailand and also the effects of the policy changes. The model explains the behavior of four economic agents: producers, household, government, and foreign countries. The results are performed in two time dimensions: short run and long run. In short run, there are two situations: fixed exchange rate regime and flexible exchange rate regime, whereas there exits only one situation of flexible exchange rate regime in the long run. Moreover, according to the theoretical framework, FDI usually brings about the managerial and expertise skills in order to be internalized under its ownership as one mine advantage over the domestic kind. This quality factor is hardly measurable therefore he assumes its existence to be absorbed in its own sake and being just little advantageous under this Neo-Classical scheme of perfective competition. The results of increase in FDI show that vulnerability in the form of real appreciation exists in both the short run and the long run cases under the flexible exchange rate regime. FDI worsens Trade Balance in all cases. The impacts on economy are very little under the case of fixed exchange rate regime. Under the flexible exchange rate regime, the government balance condition means the change from the government revenue forgone for investment incentives to the alternated policy implications as the expenditure spent by the government itself. Thus, the impacts are just from the government spending.

For the medium term impacts issue, in the study of N.C. Benjamin (1990), the intertemporal optimization for two-period in CGE model is done by adding the investment dimension to examine the macroeconomic effects of the foreign capital inflows. The next period's output in projected based on the first period developments, rather than solved for in a complete set of markets. Therefore, the cost minimizing future employment of capital and labor can be determined for any set of factor prices. So, it is only necessary to complete the future factor markets in order for producers to pick optimal investment levels.

In this approach, it is not necessary to gain perfect foresight. This study assumed that the consumers can use the consistent future price to distribute their consumption between the present and the future. However, the only terminal condition of the model is the value of the capital stock left at the end of the period two must be placed to determine the base year interest rate and investment.

In this model, dynamically optimal saving and investment behavior are intermediated by a financial market segmented into formal and informal sectors. Interest rates are signals for the intertemporal allocation of production and consumption. The model takes the nominal exchange rate and the level of foreign capital inflow exogenously. The adjustment mechanism becomes changes in the price level of domestically produced goods. The decline of the interest rate due to the capital inflows induce more investment, because of the lower required rate of return, to allocate more of current output for use in producing future output.

In aggregate, first period output is fixed due to the fixed factor supplies. The new demand for the investment drives up domestic prices relative to the exchange rate. Import shares in total consumption rise, and this leads to trade deficit, balancing the new foreign capital flow. The decline in the interest rate discourages domestic saving. The effect superseded by two other factors. First is income effect. The growth of investment demand raises wages and income while the prices are held down by the cheap imports. This income effect positively influences the savings. Second, since the first period domestic goods are expensive, with the higher investment levels the productivity is expected to increase resulting in the cheaper goods in the future.

In the Australian context, the MSG2 model has been important general equilibrium point that in the short to used to focus on a wide range of issues. The applications of the MSG2 model in the issue of capital flows were examined in McKibbin (1994). His paper showed that the impacts of NAFTA on global capital flows into Mexico are the aspect of that trading arrangement for Australia. The traditional focus of analysts on *3*questions of which countries sell which goods to NAFTA economies is shown to miss the more important general equilibrium point that in the short to medium run the dominant impact on Australia of NAFTA is through its effects on global capital markets.

Because of Australia's external debt position the reallocation of global capital towards Mexico leads to a short run loss to Australia from higher world interest rates. In the long run the higher productivity growth in NAFTA economies leads to higher income for Australia. This paper also showed that the NAFTA shock, being both a demand shock as well as a supply shock (in the sense that their is a change in allocation of the physical capital stock in Australia) is an Australia example where inflation targeting is a suboptimal policy relative to nominal income targeting in Australia.

By using GTAP model to examine linkages between trade liberalization and multilateral investment, emphasizing effects related to investment and the accumulation of capital, Joseph F., Bradley J., and Håkan N. (1996) have explored trade and investment linkages in the context of simple steady-state closure rules, where they specified explicit stylized linkages between investment and income levels, and between investment incentives and capital accumulation. The importance of these linkages was shown to hinge on the sensitivity of savings rates with respect to real returns. Empirical evidence points to a sensitivity of the level of savings to income, such that income shocks can be magnified by induced savings (Carroll and Weil, 1993). However, they remained skeptical about whether they should expect trade policy shocks to induce first-order changes in the rate of savings (Koilikoff, 1989).

The one consistent pattern to emerge from their results was the occasional lack of consistency. In particular, for some regions, like the EU and North America, the basic story told by their Uruguay Round simulations remain unchanged under a range of model structures. Clearly, capital accumulation effects and scale economies implied potential gains greater than those suggested by static, constant returns models. However, the story remained one of gains. The same could not be said for all other regions. Estimated effects for a number of developing countries hinge critically on their representation of investment effects. As resulting shifts in the resource base interact with the terms-of-trade and potential scale economies, the order of magnitude and even the sign of estimated results can be affected. Hence, while they had not addressed here how likely it is that savings rates will increase in response to shifting incentives, it was clear that this response matters. At the same time, compared to explicit fixed or

endogenous savings specifications, it was also clear that, at least for multilateral liberalization, multiplier type analysis could be a poor guide to potential accumulation effects.

In 1999, Elena Ianchovichina, Robert McDougall and Thomas Hertel offered a new disequilibrium approach to modeling international capital mobility. They showed that the disequilibrium model developed in this study has good stability properties and converges to a long-run equilibrium. Key to our disequilibrium approach is a new investment theory of adaptive expectations that emphasizes international capital movements and errors in investors' assessments of potential returns to investment. In addition, the investment theory, compatible with a simple recursive solution procedure, ensures the convergence of the model towards a stable equilibrium, brings realism into the analysis of international capital mobility and flexibility in tailoring to empirical data.

They tested the empirical performance of the model by simulating the dynamic adjustment to a marginally deeper, longer crisis in East Asia. For this purpose, they introduced the new disequilibrium theory of investment into an existing static global AGE model, GTAP (Hertel and Tsigas, 1997). The resulting, dynamic global AGE model uses the new investment theory, while preserving other features of GTAP, among which the sophisticated representation of consumer demands and a supply side that emphasizes the role of inter-sectoral factor mobility in the determination of sectoral output. This model can, therefore, be implemented by adding minimum additional data to the publicly available GTAP data base (McDougall, 1997)

To study the effect of FDI by using GTAP model, Douglas H. Brooks, Fan Zhai (2005) advanced FDI research by combining the new GTAP VI database and a global forecasting model with a new capital flow modeling component. The results indicate that all these factors have played a role in Asia's remarkable growth experience, to different degrees in different countries. Moreover, each has its own relationship to investment incentives, and policy makers must understand those relationships to attract and capture the many benefits FDI can offer.

3.5 Summary of Empirical Review

In summary, there are many empirical studies which study the impact of capital flows. Most studies imply the positive impacts of capital flows to host economies. However, some of them show negative or insignificant impact of capital flows. One of reasons that make them get different results is the different model that they used, for example, econometric model, macroeconomic model, and CGE model. Each model based on difference theory. While many studies use methodologies based on specific theory such as Solow's growth theory, other studies use models based on macroeconomic theory such as Keynesian economic theory and Classical economic theory.

It seems obvious that the CGE models are even more closely related to neoclassical theory than the econometric model and macroeconomic models which are more related to Keynesian theory.

The econometric models essentially follow the pioneering works of Klein (1950) and Klein and Goldberger (1955). They flourished in the 1960s and 1970s during the golden age of Keynesianism. With a Keynesian foundation, most of the models in this class were demand-driven. Thus, the crucial closure rule is that supply adapts itself to demand and prices do not play an integral role in short-run adjustments to imbalances (Soludo, 2002).

A typical econometric model is dynamic, nonlinear, simultaneous, and has error terms that may be correlated across equations and with their lagged values. A number of techniques have been developed for the estimation of such models. Techniques that do not take account of the correlation of the error terms across equations (limited information techniques) include two stage least squares (2SLS).

Techniques that do account for this correlation (full information techniques) include full information maximum likelihood (FIML) and three stage least squares (3SLS). These models clearly state the assumption inherent and identify the endogenous and exogenous variables. Another distinguishing feature of these models is that they spell out the behavioral, technical and institutional equations, in addition to identities and equilibrium conditions.

In the last decade or so, time series econometrics has constituted itself as a separate branch of econometrics, with its own methodological issues. Following this development, there has been a reconstruction of several macroeconometric models to incorporate modern econometric concepts of cointegration and causality. In recent times, sufficient assumptions have to be made about stationarity. The assumption, either explicit or implicit, of most macroeconometric model building work is that the variables are trend stationary. If in fact some variables are not stationary, this may make the asymptotic distributions that are used for hypothesis testing inaccurate.

Anyway, macroeconometric model has been criticized on three main grounds (Jerome, 2004). First, it has too shallow in theoretical foundations and usually has some robust empirical results independent of the economic theories, second, their structural parameters are not policy-invariant and therefore the potential policy advice derived from them can be misleading and third, the extensive data requirements mainly time series, which are still a luxury in developing countries. While these points of criticism are acknowledged, most studies do not invalidate their uses especially in short-term forecasting.

For CGE model, these types of models are an extension of Wassily Lenontief's work on empirical Walrasian models based on fixed input-output coefficients by incorporating substitution effects in both production and demand, and by including more than one consumer. The value of these models is that they have more details and complexity can be incorporated than in simple analytic models. Most CGE models

involving many sectors and also provide substantial details for policy-makers concerned with feedback effects of policy initiatives directed only at specified products or industries.

Equilibrium in this model is characterized by a set of prices and levels of production in each industry such that market demand equals supply for all commodities (including disposal if any commodity is a free good). Since producers are assumed to maximize profits, this implies that in the constant-return-to-scale case, no activity (or cost-minimizing techniques for production functions) does any better than break even at the equilibrium prices. Typically, calibration involves only one year's data, or a single observation represented as an average over a number of years.

Most Applied general equilibrium models are based on social accounting matrix (SAM) as the underlying statistical framework. A social accounting matrix (SAM) is a logical arrangement of statistical information in a country within a particular time period (usually a year). It is a single accounting framework, which arranges income flows to the institutions and sectors into an equal number of rows and columns. The number of rows and columns is flexible, changing in accordance with the nature of an economy and the purpose for which the SAM is required. It provides a conceptual basis to analyze both distributional and growth issues within a single framework. A SAM shows the distribution of factor incomes of both domestic and foreign origin, over institutional classes and re-distribution of income over these classes. In addition, it shows the expenditure of these classes on consumption, investment and savings made by them. King (1988) points out that a SAM has two main objectives: first, organizing information about the economic and social structure of a country over a period of time and second, providing statistical basis for the creation of a plausible model capable of presenting a static image of the economy along with simulating the effects of policy interventions in the economy.

A SAM brings disparate data (including input-output tables, household surveys, producer surveys, trade statistics, national accounts data, balance of payments

statistics, and government budget information) into a unified framework. It is broader than an input-output table and typical national account, showing more detail about all kinds of transactions within an economy. If the SAM is to support analyses of poverty and inequality, it must include a detailed disaggregation of households on the basis of their incomes sources or other socioeconomic characteristics (IFPRI, 2000).

A question frequently addressed by these models is whether any particular policy change is welfare-improving. In this instance, policy appraisal using these techniques usually relies upon a comparison between an existing equilibrium (i.e., with unchanged policies), and a counterfactual equilibrium computed with modified policies. Because underlying theoretical structure of these models is firmly rooted in traditional micro-theory, a common procedure is to construct numerical welfare measures of the gain or loss. The measures most widely employed are Hicksian compensating and equivalent variations associated with the equilibrium comparison. The compensating variation (CV) takes the new equilibrium incomes and prices, and asks how much income must be taken away or added in order to return households to their pre-change utility level. The equivalent variation (EV) takes the old equilibrium income and prices and computes the change needed to achieve new equilibrium utilities. For a welfare-improving change, the CV is negative and the EV is positive, although it is quite common to employ a sign convention so that a positive value for either measure indicates a welfare improvement.

The traditional approach to applied general equilibrium modeling has been criticized by Jorgensen (1984), Wilcoxen (1988), Diewert and Lawrence (1994) and others on several grounds. First, selection of a single base year means that whatever stochastic anomalies are present in observations for that period will be unduly influential on the model structure. Second, parameters drawn from eclectic sources may be outdated, or refer to different industry, commodity, or regional aggregates than those defined in the model. Third, the functional forms typically used are those nested in CES

aggregators, which impose strong a priori restrictions on behavioral responses to price changes.

Because most econometric model, macroeconomic model, and CGE model based on different concept and have different in their strong points and weak points, study impact of FDI by using different methodology will get diverse results. Therefore, in next chapter, we try to study the impact of FDI in East Asian countries by using three different methodologies to verify the impact of FDI to economic development across three methodologies. In studying the impact of on economic growth and international trade, we use panel cointegration analysis with based on the framework of the solow and endogeneous growth model and gravity model. Secondly, we study the impact of FDI to macro economy by using GTAP model and, thirdly, we also specify a macroeconomic model based on CAM model of world economy framework to analyze the impacts of FDI on macro economy; finally, we will synthesize all findings to draw implications on factors likely to be conductive for trade and growth in the last chapter.

CHAPTER IV
EMPIRICAL STUDY OF IMPACT OF FDI USING PANEL COINTEGRATION ANALYSIS

4.1 Effect of Foreign Direct Investment on Economic Growth in East Asian countries

4.1.1 Introduction

The relationship between foreign direct investment (FDI) and economic growth is a well-studied subject in the development economics literature, both theoretically and empirically. Recently, renewed interest in growth determinants and the considerable research on externality-led growth, with the advent of endogenous growth theories (Barro, 1991; Barro and Sala-i-Martin, 1995), made it more plausible to include FDI as one of the determinants of long run economic growth. The interest in the subject has also grown out of the substantial increase in FDI flow that started in the late 1990's, and led to a wave of research regarding its determinants.

Despite the considerable volume of research on the subject, there is conflicting evidence in the literature regarding the question as to how FDI relates to economic growth. In particular, a two-way interaction has been discussed in the literature of FDI-growth relationship. On one hand, FDI is being seen, by many, as an important element in the solution to the problem of scarce local capital and overall low productivity in many developing countries (De Mello, 1999; Eller, et. al, 2005). Hence, the flow of foreign direct capital is argued to be a potential growth-enhancing player in the receiving country. This view is challenged by many authors. For example, Carkovic and Levine (2002) show that there is no robust impact from FDI on growth if country-specific level differences, endogeneity of FDI inflows and convergence effects are taken into account.

In accordance with dissertation objectives, some major hypothesis is created. The main hypothesis is that FDI is an important factor for the economic development by contributes to the transfer of technologies and the increase of productivity. Furthermore, FDI may come with the market share for export goods. For example, when Japan invests more direct investment in Thailand, they usually already have their markets to sell the goods. And the latter case seems to effect economic growth more than the former case.

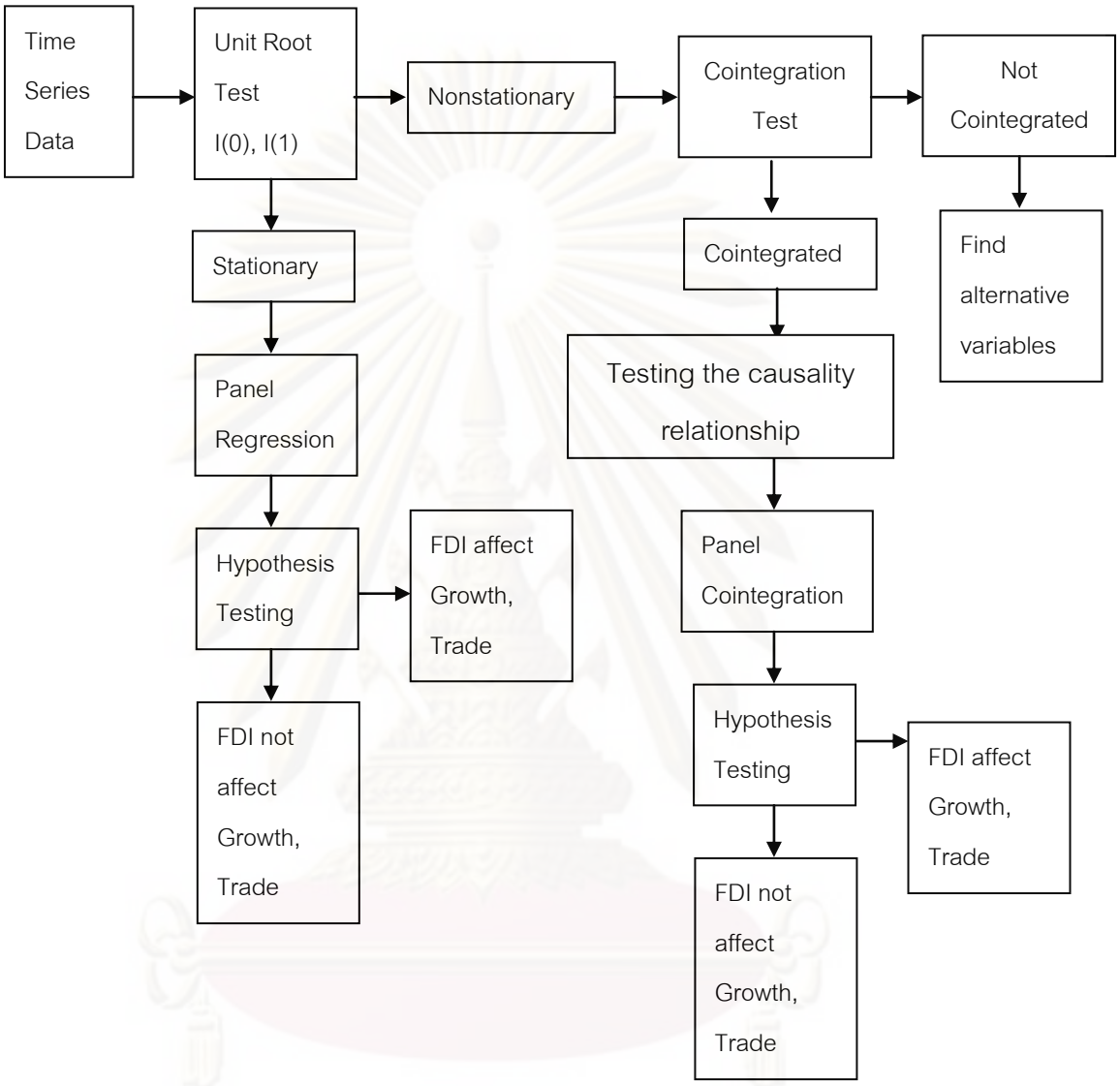
In this part, the panel cointegration analysis based on the framework of the solow and endogeneous growth model is use in order to find the impact of FDI on economic growth in East Asian countries.

4.1.2 Panel Cointegration Analysis

In panel cointegration analysis, there are three steps: firstly, the panel unit root test is used to test whether the variables used in this study are stationary or not. If the variables are stationary, we can use panel regression to estimate equation. If the variables are non-stationary, secondly, we have to use cointegration test to test whether the variables in the equation have long-term relationship or not. In this step, we use the residual term obtained from long-run equation and test with panel unit root test.

Finally, when all variables are cointegrated or have long-term relationship, we can estimate long-run equation by using panel estimation. The estimation procedure of panel cointegration analysis is show in the diagram below.

Figure 4.1 Estimation procedure of panel cointegration analysis



4.1.2.1 The Panel Data Framework

The general model can be written for individual *i* as follows:

$$y_i = X_i \beta + e_i \quad (4.1)$$

where $i = 1, 2, \ldots, N$, and $E[e] = 0$

$$E\left[e_i e_j'\right] = \frac{\sigma_{ij}}{1-\rho_i \rho_j}\begin{bmatrix} 1 & \rho_j & . & . & \rho_j^{T-1} \\ \rho_i & 1 & . & . & \rho_j^{T-2} \\ . & . & . & . & . \\ . & . & . & . & . \\ \rho_i^{T-1} & \rho_i^{T-2} & . & . & 1 \end{bmatrix} \quad (4.2)$$

$$e_{ij} = \rho_i \, e_{i,t-1} + \zeta_{it} \quad (4.3)$$

where $y_i = (y_{i1}, \ldots, y_{iT})$ is a vector of dependant variables, X is a matrix of explanatory variables, β is a vector of parameters to be estimated, and e is the disturbance vector that follows the above conditions together with $E[\zeta_{it}] = 0$, $E[\zeta_{it}\, \zeta_{jt}] = \sigma$, and $E[\zeta_{it}\, \zeta_{is}] = 0$ for all $t \neq s$. This model assumes that coefficients are the same for all individuals, the disturbance vector for a given individual follows a first order autoregressive process, that the disturbance can be different for different individuals, and that the disturbances for different individuals are contemporaneously correlated. However, this model requires a set of assumptions that may be too stringent, specifically assuming that all coefficients are constant. Therefore, we also estimated the model under the assumption that the slope coefficients are constant but that the intercept may change according only to individuals.

This model can be expressed as follows:

$$y_{it} = \overline{\beta_1} + \eta_i + \sum_{k=2}^{K} \beta_k X_{kit} + \varepsilon_{it} \quad (4.4)$$

where i = 1, 2,…, N, and t = 1, 2,…, T. In this model, $\bar{\beta}_1$ is the average intercept while η_i is the individual effect of unobserved heterogeneity that captures the possibility of a changing intercept over individuals.

The correct estimation for this last model depends on whether we assume that η_i is assumed to be fixed parameters, referred to as the fixed effects model or random variables, referred to as the random effects model. If we assume that η_i is fixed, the dummy variable model will be the appropriate one. On the contrary, if η_i is assumed to be random, we should estimate the model using an error component model. However, if the effects are correlated with X_{it}, common RE model is misspecified and the resulting estimator is biased.

The advantages of fixed effects (FE) specification are that it can allow the individual and/or time specific effects to be correlated with explanatory variables X_{it}. Neither does it require an investigator to model their correlation patterns. The disadvantages of the FE specification are: (a) The number of unknown parameters increases with the number of sample observations. In the case when T (or N) is finite, it introduces the classical incidental parameter problem (e.g. Neyman and Scott (1948)). (b) The FE estimator does not allow the estimation of the coefficients that are time-invariant.

The advantages of random effects (RE) specification are: (a) The number of parameters stay constant when sample size increases. (b) It allows the derivation of efficient estimators that make use of both within and between (group) variations. (c) It allows the estimation of the impact of time-invariant variables.

To choose between the two specifications, the Breusch-Pagan Lagrange multipliers test and the Hausman specification test helped us on the selection of the appropriate model (i.e. pooled vs. individual effects, and fixed vs. random effects). For example, the null hypothesis of Hausman test is: H_0: $E(\eta_i | X_{it}) = 0$ which mean that if we accept null hypothesis or there is no correlation between regressors and effects, then FE and RE are both consistent, but FE is inefficient. On the other hands, if there is correlation, FE is consistent and RE is inconsistent.

Moreover, to study the effect of financial integration in terms of capital flows to the global economy, we will use GTAP model and the world economy model.

4.1.2.2 Panel Unit Root Test

In the first stage of the study, to test the stability of the data, we use of a panel unit root test (Im, Peseran and Shin (2003)), the format of the equation is the same as Augmented Dickey-Fuller (ADF) unit root test.

$$\Delta X_{it} = \alpha_{1i} + \rho_{1i} X_{it-1} + \sum_{j=1}^{\rho_{1i}} \theta_{1ij} \Delta X_{it-1} + \varepsilon_{1it} \quad (4.5)$$

Where

α_i is the coefficients of the equation which shows the difference between data in each cross section

ε_{it} is the residual which is independent and identically distributed (iid)

$\sum_{j=1}^{\rho_i} \theta_{ij} \Delta X_{it-1}$ is the term used to correct autocorrelation problem

X is variables in the equation including GDP (GDP_{it}), inward FDI ($FDI\ Flow_{it}$), inflation rate (INF_{it}) level of education (EDU_{it}), government investment in infrastructure (GI_{it}), and trade openness ($OPEN_{it}$)

The null hypothesis of panel unit root test is that ρ_i equal to zero $(H_0: \rho_i = 0)$, in other word, the variable is non-stationary.

4.1.2.3 Granger's causality test

In Granger causality approach, the relationship is expressed in two pairs of regression equations by simply twisting independent and dependent variables as follows:

$$X_t = B_{1,1}X_{t-1} + B_{1,2}X_{t-2} + \ldots + B_{1,t}X_{t-p} + B_{2,1}Y_{t-1} + B_{2,2}Y_{t-2} + \ldots + B_{2,p}Y_{t-p} + u_{1,t} \quad (4.6)$$

$$Y_t = B_{2,1}Y_{t-1} + B_{2,2}Y_{t-2} + \ldots + B_{2,p}Y_{t-p} + B_{1,1}X_{t-1} + B_{1,2}X_{t-2} + \ldots + B_{1,t}X_{t-p} + u_{2,t} \quad (4.7)$$

$$X_t = B_{1,1}X_{t-1} + B_{1,2}X_{t-2} + \ldots + B_{1,t}X_{t-p} + u_{1,t} \quad (4.8)$$

$$Y_t = B_{2,1}Y_{t-1} + B_{2,2}Y_{t-2} + \ldots + B_{2,p}Y_{t-p} + u_{2,t} \quad (4.9)$$

Equations (4.6) and (4.7) are called unrestricted, (4.8) and (4.9) restricted.

According to Granger's definition of causal relationships:

Y does not cause X, if $B_{2,1} = B_{2,2} = \ldots\ldots = B_{2,p} = 0$ (4.10)

And X does not cause Y, if $B_{1,1} = B_{1,2} = \ldots\ldots = B_{1,p} = 0$ (4.11)

In order to judge whether these conditions hold, Granger employ the following F-statistic to be applied to equations (4.6) and (4.7) relative to equations (4.8) and (4.9):

$$F = [(R^2_{UR} - R^2_R) / m] / [(1-R^2_{UR}) / (n-2)(m-1)] \quad (4.12)$$

Where: R^2_{UR} = the coefficient of determination of unrestricted equation

R^2_R = the coefficient of determination of restricted equation

n = the number of observations

m = the number of lagged periods

With this test, the direction of causality is judged as follows:

The result of F test	Direction of Causality
1) (4.10) holds, (4.11) does not hold	: X causes Y (X -> Y)
2) (4.10) does not hold, (4.11) holds	: Y causes X (Y -> X)
3) Both (4.10) and (4.11) hold	: Feedback between X and Y(X <--> Y)
4) Neither (4.10) nor (4.11) holds	: X and Y are independent

4.1.3 Data sources

In this paper, the study focuses on investigating the impact of FDI on economic growth, international trade, and others macroeconomic variables including exchange rate, interest rate, private consumption and investment, and government expenditure. The methodology involves estimating economic models which provide for capturing the impact of FDI on economic development, using data for the period 1986-2007 of East Asian countries including Cambodia, China, Hong Kong, India, Indonesia, Japan, South-Korea, Laos, Malaysia, Myanmar, Philippines, Singapore, Taiwan, Thailand, and Vietnam. Our secondary data were collected from the International Monetary Fund (IMF), UNCTAD, and CEIC database.

4.1.4 Model Specification

Base on Zang (2006), to find the impact of FDI on economic growth, he applies the Solow growth model by assuming that technology is the function of only FDI.

$$Y_t = A_t L^{b1}_t K^{b2}_t \quad (4.13)$$

$$A_t = B*FDI^{b3}_t \quad (4.14)$$

Where

Y = GDP

A = Technology of production

L = Labor

K = Capital

FDI = Inward Foreign Direct Investment

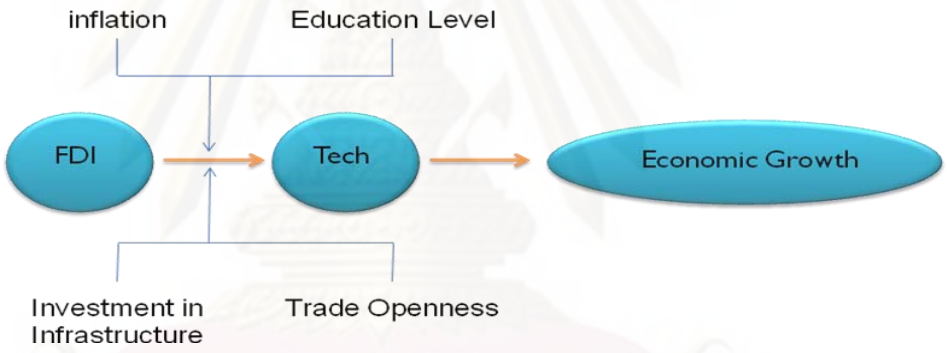
After substitutes A into a production function and takes logarithm, he gets:

$$\ln(GDP_{it}) = b_{0i} + b_1 \ln(L_{it}) + b_2 \ln(I_{it}) + b_3 \ln(FDI_{it}) + u_{it} \quad (4.15)$$

In this study, despite only FDI base on Zang (2006), we also assume that inflation, education level, government expenditure on investment, and international trade policy can affect technology of production.

According to the studies of Edward (1997), Yanikkaya (2002), Balamurali and Bogahawatte (2004), and Roy and Berg (2006), their studies conclude that level of human capital is one of the important factors that can increase more technology of production. Moreover, high level of infrastructure also helps in increase technology of production because it will decrease the cost of production. Finally, countries with high degree of trade openness tend to have more ability to absorb technology which comes from FDI. The framework of our growth model is show in figure 4.2.

Figure 4.2 Framework of Growth Model



In this case, the form of technology function will be as follow:

$$A_t = B^*FDI^{b3}_t\, Edu^{b4}_t\, GI^{b5}_t\, Open^{b6}_t\, Inf^{b7}_t \qquad (4.16)$$

And the production function will be in this form:

$$\begin{aligned} \ln(GDP_{it}) = {} & b_{0i} + b_1 \ln(L_{it}) + b_2 \ln(I_{it}) \\ & + b_3 \ln(FDI_{it}) + b_4 \ln(Edu_{it}) + b_5 \ln(GI_{it}) \\ & + b_6 \ln(Open_{it}) + b_7 \ln(Inf_{it}) + b_8 \ln(D97_{it}) + u_{it} \end{aligned} \qquad (4.17)$$

Where

Y	=	GDP
A	=	Technology of production
L	=	Labor
I	=	Investment
FDI	=	Inward Foreign Direct Investment
EDU	=	Ratio of people upper secondary level of education to total population
INF	=	Inflation Rate
GI	=	Government investment
Open	=	Trade openness
D97	=	dummy variable for financial crisis in 1997 which equal to 1 when period 1997-1998 and equal to zero otherwise

Moreover, in order to verify that countries which have difference in economic conditions will receive different benefits from FDI, we assume that education level, government expenditure on investment, and international trade also have interaction effects with FDI in promoting economic growth. Then we get the equation (4.18):

$$\begin{aligned} \ln(GDP_{it}) = {} & b_{0i} + b_1 \ln(labor_{it}) + b_2 \ln(investment_{it}/GDP_{it}) \\ & + b_3 \ln(FDI\ Flow_{it}) + b_4 \ln(Edu_{it}) + b_5 \ln(GI_{it}) \\ & + b_6 \ln(Openness_{it}) + b_7 \ln(Inf_{it}) + b_8 \ln(D97_{it}) \\ & + b_9 \ln(Educ_{it})*\ln(FDI\ Flow_{it}) + b_{10} \ln(GI_{it})*\ln(FDI\ Flow_{it}) \\ & + b_{11} \ln(Openness_{it})*\ln(FDI\ Flow_{it}) + u_{it} \end{aligned} \qquad (4.18)$$

The main hypothesis is that FDI is an important factor for the economic development by contributes to the transfer of technologies and the increase of productivity. Therefore the coefficient value of FDI (b_3) has to be positive and statistically significant. And in the last production function, the coefficient value b_9 to b_{11} should be

positive and statistically significant to show that other economic factors can support FDI in stimulating economic growth.

4.1.5 Empirical results of the relation between FDI and Economic growth

First, we divide 15 countries into three groups by using their income level: high income countries, middle income countries, and low income countries and study the impact of FDI on economic growth case by case. The high income level countries include Hong Kong, Japan, Korea, Singapore, and Taiwan. The second group is middle income countries including China, India, Indonesia, Malaysia, Philippines, and Thailand. The third group is low income countries which include Cambodia, Laos, Myanmar, and Vietnam. Table 4.1 reveals that education, government Investment, and trade openness in high income countries

Table 4.1 Summary of descriptive statistics:

	High income	Middle income	Low income
Income per capita	21,697.78	1,926.35	293.26
Education	14.82	9.96	6.08
Government Investment	169,085.00	47,961.77	758.14
Trade openness	169.25	97.88	66.34

By using panel cointegration analysis, firstly, we have to test for the stationary of all variables. In this study, we use ADF panel unit root test to test whether the variable is stationary or not. The null hypothesis of this test is that the variable is nonstationary. By considering ADF t-statistics in Table 4.2, most variables in the model except labor, education level, and inflation are non-stationary at the level form but stationary at first difference form.

Table 4.2 Panel Unit Root Test: Growth Model

	Level		1st different	
	ADF t-statistics	Prob	ADF t-statistics	Prob
Real GDP	15.0386	0.98	60.4863	0.00
labor	55.8556	0.00		
education level	72.0810	0.00		
government investment	24.5853	0.74	78.5391	0.00
trade openness	23.0563	0.81	123.860	0.00
inflation	100.261	0.00		
total investment / GDP	38.0941	0.14	125.801	0.00
FDI flow	24.4271	0.17	110.692	0.00
education level * (FDI flow)/ GDP)	24.2258	0.76	111.358	0.00
government investment * (FDI flow / GDP)	12.3958	0.99	101.097	0.00
trade openness * (FDI flow / GDP)	24.4576	0.75	102.068	0.00

However, although most variables used in this study are instability (non-stationary), the theory of long-term relationship (Cointegration Analysis) says that these variables have long-run relationship when the residual of the equation is stationary. Therefore, in next step we use Panel Cointegration test to test whether there is long run relationship among FDI and other variables or not.

As shown in table 4.3, the result of panel cointegration test show that all variables are cointegrated for all case studies. In other word, there are long run relationship among FDI and other macroeconomic variables for all countries groups.

Table 4.3 Panel Cointegration Test: Growth Model

ADF Unit Root Test of Residual	Pool OLS	Fixed Effect
Hong Kong, Japan, Korea, Singapore, Taiwan	28.8578*	50.1632*
China, india, Indonesia, Malaysia, Philippines, Thailand	25.2406*	25.5976*
Cambodia, Laos, Myanmar, Vietnam	27.1991*	32.7028*

* The probabilities of ADF t-statistics is close to 0.00 which is less 5% level of significance.

In next step, we want to verify the causality relationship between FDI and economic growth. Although many studies study implies a causality direction from FDI to economic growth, the causality test is still needed to feel more confident about the existence and the direction of a causality relationship as such. We therefore choose, in this article, to employ test based on Granger's (1969) definition of causality.

Table 4.4 and table 4.5 summarize the results of the research. As seen from the table, F-statistics were calculated for the panel data as well as for each country based on respective time series. F values computed with panel data indicate causation from FDI to economic growth at 5% a level in most countries except Korea, Philippines, and Singapore. We tend to interpret this finding as a feedback phenomenon at 5% a level which supports Patrick's (1966) argument of two-way causation between financial and economic variables.

Table 4.4 Granger's causality F-Statistics: FDI

	FDI does not cause GDP	FDI does not cause Growth	FDI/GDP does not cause GDP	FDI/GDP does not cause Growth
Cambodia	18.96**	0.99	8.97**	1.22
China	22.22**	4.43**	2.48	4.47**
Hong Kong	0.26	18.87**	0.33	25.77**
India	5.5**	1.12	0.95	0.06
Indonesia	0.73	4.9*	1.86	4.42*
Japan	8.23**	1.19	4.99	1.39
Korea	1.15	4.82	0.66	0.1
Lao	0.2	4.85**	0.7	4.09**
Malaysia	7.2**	0.86	7.19**	2.09
Myanmar	0.55	4.46**	0.31	3.22*
Philippines	0.68	1.19	0.6	0.71
Singapore	1	0.7	0.98	2.07
Taiwan	1.89	14.79**	1.83	8.76**
Thailand	9.01**	0.15	5.66**	1.03
Vietnam	3.35*	14.48**	0.19	0.42

* indicate significant at 90% level of significant

** indicate significant at 95% level of significant

In Table 4.5, F values reveal that economic growth cause FDI at 5% a level in China, India, Korea, Singapore, and Thailand.

Table 4.5 Granger's causality F-Statistics: GDP

	GDP does not cause FDI	GDP does not cause FDI/GDP	GROWTH does not cause FDI	GROWTH does not cause FDI/GDP
Cambodia	15**	3.34	0.53	1
China	21.59**	8.39**	8.66**	14.58**
Hong Kong	1.64	1.39	0.32	0.22
India	4.57**	4.79**	2.37	8.08**
Indonesia	0.24	1.14	0.26	2.13
Japan	0.47	0.62	1.11	1.55
Korea	261.18**	0.84	20.68**	0.62
Lao	4.07**	0.41	0.18	0.1
Malaysia	3.28	0.39	0.17	0.52
Myanmar	0.99	0.16	0.41	0.25
Philippines	4.08**	2.9	0.02	1.56
Singapore	3.87*	17.03**	0.48	3.69*
Taiwan	1.02	1.22	0.52	0.62
Thailand	3.78*	17.96**	4.84**	3.16*
Vietnam	6.28**	1.94	1.71	0.52

* indicate significant at 90% level of significant

** indicate significant at 95% level of significant

As seen from the Table 4.4 and 4.5, it is very difficult to draw generalizations about the direction of causality for countries falling into different income groups. Nevertheless, relative number of cases reflecting unidirectional and feedback relationship is seemingly higher in medium income countries including China, India, and Thailand. The numbers of cases reflecting independency is only Philippines. These results can indicate the relationships between FDI and economic growth in East Asian countries that FDI can effect economic growth. Then we can go to the next step, panel cointegration test.

From the results of panel cointegration test, we can estimate this growth equation using pool regression and panel fixed effect model in order to find long-run relationship between FDI and economic growth.

From table 4.6 to table 4.7, when we look at the value of the coefficient of FDI flow (b_3) in all equations, FDI has positive relationship with economic growth in all countries group except low income countries which has t-stat only 1.52 when using fixed effect method.

Table 4.6 Estimated Results: equation 4.17

	High Income		Middle Income		Low Income	
	Pool OLS	Fixed Effect	Pool OLS	Fixed Effect	Pool OLS	Fixed Effect
Constant	-4.71	-5.50	-2.75	-4.24	-2.15	-4.36
	(3.20)	(5.20)	(1.60)	(2.85)	(2.74)	(3.35)
Labor	1.46	1.31	1.17	1.10	2.53	3.08
	(9.28)	(5.45)	(4.89)	(3.82)	(7.65)	(3.62)
Total investment	2.76	3.14	1.03	1.04	1.38	1.08
	(7.68)	(1.74)	(1.60)	(1.59)	(1.98)	(1.00)
FDI Flow	1.28	1.10	1.26	1.29	1.36	1.14
	(3.97)	(2.66)	(3.19)	(5.12)	(3.27)	(1.52)
Dummy 97	-3.09	-2.05	-3.07	-2.05	-3.02	-3.07
	-(2.99)	-(3.15)	-(2.66)	-(2.73)	-(3.13)	-(2.81)
Education	0.80	0.74	0.68	0.86	0.09	0.15
	(6.26)	(4.42)	(1.49)	(4.85)	(0.02)	(0.64)
Government Investment	0.45	0.65	0.87	0.55	0.26	0.35
	(12.30)	(17.56)	(16.07)	(9.63)	(2.48)	(3.85)
Trade openness	0.40	0.09	0.47	0.30	0.03	0.13
	(4.20)	(1.94)	(3.94)	(3.57)	(1.43)	(1.65)
Inflation	-1.37	-1.59	-1.51	-2.14	-2.66	-2.19
	-(1.52)	-(1.36)	-(2.96)	-(2.63)	-(2.57)	-(2.24)
Number of observations	110	110	127	127	94	94
R2 (adjust)	0.55	0.58	0.63	0.66	0.84	0.86
Durbin-Watson Stat	1.46	1.61	1.82	1.72	1.92	2.20

Table 4.7 Estimated Result: equation 4.18

	High Income		Middle Income		Low Income	
	Pool OLS	Fixed Effect	Pool OLS	Fixed Effect	Pool OLS	Fixed Effect
Constant	-4.82	-5.63	-2.81	-4.34	-2.20	-4.46
	-(3.28)	-(5.32)	-(1.64)	-(2.92)	-(2.80)	-(3.43)
Labor	1.49	1.34	1.20	1.13	2.59	3.15
	(9.50)	(5.58)	(5.00)	(3.91)	(7.83)	(3.70)
Total investment	2.82	3.21	1.05	1.06	1.41	1.11
	(7.86)	(1.78)	(1.64)	(1.63)	(2.03)	(1.02)
FDI Flow	1.31	1.13	1.29	1.32	1.39	1.17
	(4.06)	(2.72)	(3.26)	(5.24)	(3.35)	(1.56)
Dummy 97	-3.16	-2.10	-3.14	-2.10	-3.09	-3.14
	-(3.06)	-(3.22)	-(2.72)	-(2.79)	-(3.20)	-(2.88)
Education	0.82	0.76	0.70	0.88	0.09	0.15
	(6.41)	(4.52)	(1.52)	(4.96)	(0.02)	(0.66)
Government Investment	0.46	0.67	0.89	0.56	0.27	0.36
	(12.59)	(17.97)	(16.45)	(9.86)	(2.54)	(3.94)
Trade openness	0.41	0.09	0.48	0.31	0.03	0.13
	(4.30)	(1.99)	(4.03)	(3.65)	(1.46)	(1.69)
Inflation	-1.40	-1.63	-1.55	-2.19	-2.72	-2.24
	-(1.56)	-(1.39)	-(3.03)	-(2.69)	-(2.63)	-(2.29)
Education*(FDI flow / GDP)	0.40	0.24	0.16	0.22	0.08	0.13
	(1.91)	(1.74)	(1.21)	(1.38)	(0.83)	(0.99)
Government Investment*(FDI flow / GDP)	0.54	0.62	0.33	0.25	0.11	0.08
	(2.38)	(3.69)	(2.24)	(2.63)	(1.85)	(1.34)
Trade openness*(FDI flow / GDP)	0.21	0.24	0.15	0.18	0.07	0.04
	(2.76)	(2.56)	(2.47)	(2.95)	(1.31)	(1.62)
Number of observations	110	110	127	127	94	94
R2 (adjust)	0.69	0.70	0.72	0.74	0.82	0.83
Durbin-Watson Stat	0.79	1.06	1.75	1.86	2.04	2.47

In table 4.6, we conclude that other factors that support FDI in promoting economic growth are different among country groups. In high income countries, educational level, government investment in infrastructure, and trade openness can support FDI in promoting economic growth, as we can see the positively significant of coefficients b_9, b_{10}, and b_{11}. While in middle income countries, only coefficients b_{10}, and b_{11} are significant. Its mean that, in middle income countries, government investment and trade openness can support FDI in promoting economic but educational level cannot. And in low income countries, there are no factors that can support FDI in promoting economic growth.

According to the growth model we can conclude that FDI has a positive relationship with economic growth in East Asian countries that have appropriate economic conditions such as developed and middle income countries which have high education level, high degree of government investment and trade openness. In low income countries, we cannot verify that FDI can promote economic growth because the FDI coefficient (b_3) is insignificant when we use fixed effect method. Moreover, low income countries will get less benefit because they don't have appropriate facilities from both government investment, low level of trade openness, and unskilled labor force. Therefore, they cannot be able to absorb the benefit from FDI. Low income countries need to invest in education, and infrastructure including opening up to trade in order to reap a greater benefit from FDI.

4.2 Effect of Foreign Direct Investment on International Trade

4.2.1 Introduction

There has been, traditionally, a divergence in terms of the development of the theories on FDI and international trade. Trade theory, attempts to explain why countries trade with each other and FDI theory tries to account for why firms produce abroad and invest in particular countries. In the neoclassical approach of trade theory, the paper of Mundell (1957) was the first to focus on the relationship between, capital movements and trade of commodities. In the HOS framework, in taking account of the assumptions of perfect competition and constant economies of scale, Mundell argued that a tariff protection would generate a perfect substitution between capital movements and trade of commodities.

Moreover, the question of complimentarily and substitution was raised again with the new international theory developed at the end of the 1970's and dealing with imperfect competition and increasing economics of scale. In the beginning, Vernon (1966) developed the famous product cycle model, in which he considered that FDI affiliates' production and sales in foreign market replace trade in the same market. Moreover, the "electric theory" or the OLI: Ownership, location and internalization paradigm developed by Dunning (1981) points out that trade and FDI as alternative strategies of multinational firms. In general, this microeconomic analysis of firm's internalization choices predicts this substitute relationship between FDI and trade.

Some earlier theoretical work has predicted either a substitute or complementary relationship between FDI and trade. These models are based on the imperfect competition, the economics of scale, the difference in production technologies, etc. Some have focused mainly on either vertical or horizontal FDI. In the first case, firms separate geographically their different stages of the value-added chain. In the second case, firms duplicate the entire production process in several countries with an exception for headquarters activities.

The models of Helpman (1984) and Helpman and Krugman (1985) integrate vertical FDI into international trade theory. They show that FDI generates complementary trade flows of finished goods from foreign affiliates to parent companies or to the home country and intra firm transfers of intangible headquarters services from parent companies to foreign affiliates. On the other hand, in the models based on horizontal FDI, such as Markusen (1983), Brainard (1993), Horstmann and Markusen (1992), Markusen and Venables (1995), and Markusen (1995), foreign investment are alternatives modalities. The choice of multinational firms depends on the interaction between these key elements: the firm specific advantages (activities of research and development, managerial know-how, etc.), the plant-level scale economies, and transport costs, geographical and cultural distance costs. In these models, the substitutability between FDI and trade prevails over complementarity.

According to the models of Brainard (1993) and Horstmann and Markusen (1992), when countries are identical in technologies, preferences, and factor endowments, the higher the value of firm-level scale economies and tariffs and transport costs relative to plant-level scale economies, the more likely is the presence of horizontal FDI. These models based on the trade-off between proximity and concentration postulate a substitution relationship between horizontal FDI and trade.

Markusen and Venables (1995) further elaborated the theory to introduce asymmetries between countries in terms of market size, factor endowments, and technologies. Countries' asymmetries make it possible for national and multinational firms and, therefore, trade and FDI to coexist. However, as countries become more similar in market size, relative factor endowments, and technical efficiency, FDI will increase and international economic activity will become increasingly dominated by MNEs, which displace trade, provided that transport costs are not very small.

The contributions within the theoretical literature show the ambiguity of the relationship between FDI and international trade. The conclusions of models are shared between substitutability and complementarity.

4.2.2 Model specification

In this part, we want to find the impact of FDI on economic international trade in East Asian countries using panel cointegration analysis based on the framework of the gravity model.

The Gravity Model applies the Newtonian idea to the study of trade between countries and assumes that trade between any two countries is positively affected by their income and negatively affected by their distance. The basic gravity model takes the following logarithmic form:

$$\ln Trade_{ijt} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln Distance_{ijt} + \mu_{it} \quad (4.19)$$

Where $Trade_{ij}$ is the value of country i imports from (or exports to) country j, Y_i and Y_j stands for the GDP of countries i and j respectively, and $Distance_{ij}$ is the geographical distance between two countries. The GDP captures the market dimension and is expected to have a positive effect on trade between pairs of countries, while distance is a proxy to transport costs and has a negative effect. The basic model has been modified in a variety of studies trough the inclusion of additional explanatory variables in order to capture different factors that facilitate or obstruct trade between countries. In this paper, the gravity equation is also extended to include two FDI variables: $FDIT_{ij}$ – FDI flows from trading partner j to country i and $FDINT_{ij}$ – FDI flows from non trading partner j to country i. The main objective is to test for the complementary or substitute relation between FDI and trade flows. The final equation for gravity model in this study is equation 4.20.

$$\ln Trade_{ijt} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln Distance_{ijt} + \beta_4 \ln FDIT_{ijt} + \beta_5 \ln FDINT_{ijt} + \mu_{it} \quad (4.20)$$

We still use panel cointegration technique to estimate equation gravity equation to find the impact of FDI on trade. The data is annually data cover 2000 – 2007 of 15 East Asian countries set as well as in the first step. To test for the complementary of FDI

and trade; the coefficient value β_4 and β_5 have to be positive and statistically significant.

4.2.3 Empirical results of the relation between FDI and International trade

In this part, we use export and import as dependent variable in the gravity equation. Therefore, we have two equations in this part: export equation, and import equation.

$$\ln Export_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln Distance_{ij} + \beta_4 \ln FDIT_{ij} + \beta_5 \ln FDINT_{ij} + \mu_{ij} \quad (4.21)$$

$$\ln Import_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln Distance_{ij} + \beta_4 \ln FDIT_{ij} + \beta_5 \ln FDINT_{ij} + \mu_{ij} \quad (4.22)$$

Where $export_{ij}$ is the value of country i exports to country j and $import_{ij}$ is the value of country i imports from country j. GDP_i and GDP_j stands for the GDP of countries i and j respectively and $Distance_{ij}$ is the geographical distance between two countries. The GDP variables capture the market dimension and are expected to have a positive effect on trade between pairs of countries, while distance is a proxy to transport costs and has a negative effect.

The basic model has been modified trough the inclusion of additional explanatory variables in order to capture different factors that facilitate or obstruct trade between countries. In this paper, the gravity equation is also extended to include two FDI variables: $FDIT_{ij}$ – FDI flows from trading partner j to country i and $FDINT_{ij}$ – FDI flows from non trading partner j to country i. The main objective is to test for the complementary or substitute relation between FDI and trade flows.

We still divide our 15 sample countries into three groups by using their income level and study the relationship between FDI and trade in case by case. The high

income level countries include Hong Kong, Japan, Korea, Singapore, and Taiwan. The middle income countries include China, India, Indonesia, Malaysia, Philippines, and Thailand. The third group is low income countries which include Cambodia, Laos, Myanmar, and Vietnam.

Firstly, we have to test for the stationary of all variables. Table 4.7 shows that most variables in the model except GDP_j, is non-stationary at the level form but stationary at first difference form.

Table 4.8 Panel Unit Root Test: Gravity model

	Level		1st different	
	ADF t-statistics	Prob	ADF t-statistics	Prob
Export	18.9359	0.99	-20.3554	0.00
Import	14.2608	0.97	-25.1723	0.00
GDP i	-1.9785	0.61	-27.5102	0.00
GDP j	-15.1683	0.00		
FDI T	-1.0488	0.93	-12.4467	0.00
FDI NT	9.1921	0.99	-6.6873	0.00

Then next step we use Panel Cointegration test to test whether there is long run relationship among FDI and other variables or not.

Table 4.9 Panel Cointegration Test for export equation

ADF Unit Root Test of Residual	Pool OLS	Fixed Effect
Hong Kong, Japan, Korea, Singapore, Taiwan	-17.5514*	-19.0042*
China, india, Indonesia, Malaysia, Philippines, Thailand	-9.6188*	-10.1841*
Cambodia, Laos, Myanmar, Vietnam	-20.0580*	-18.9997*

* The probabilities of ADF t-statistics is close to 0.00 which is less 5% level of significance.

Table 4.10 Panel Cointegration Test for import equation

ADF Unit Root Test of Residual	Pool OLS	Fixed Effect
Hong Kong, Japan, Korea, Singapore, Taiwan	-13.4159*	-14.1969*
China, india, Indonesia, Malaysia, Philippines, Thailand	-17.2869*	-17.3259*
Cambodia, Laos, Myanmar, Vietnam	-20.7725*	-20.3232*

* The probabilities of ADF t-statistics is close to 0.00 which is less 5% level of significance.

As shown in table 4.9 and table 4.10, the result of panel cointegration test show that all variables in gravity equations are cointegrated for all case studies. In other word, there are long run relationship among FDI and other variables for all countries groups in gravity model.

From the results of panel cointegration test, we can estimate these gravity equations using pool regression and panel fixed effect model in order to find long-run relationship between FDI and international trade. The estimated results are shown in table 4.11 and table 4.12

For export, as shown in table 4.11, the values of coefficients of all variables follow the hypothesis of gravity model. The relationship between export and host country's GDP, export and trade partner's GDP are positive and significant. The relationship between export and distance is negative but it significant only in high income countries. And the relationship between export and FDI of trade and non-trade partner are positive and significant. These mean that FDI will make host countries export more goods to both home countries and other countries which are not source of FDI in flows. Therefore, it is complementary of FDI and export in East Asian countries.

For import, table 4.12, the relationship between import and host country's GDP, import and trade partner's GDP are also positive and significant. The relationship between import and distance is negative but it is insignificant in middle income

countries. The relationship between import and FDI of trade partner are positive and significant for all countries groups. However, the relationships between import and FDI of non-trade partner are insignificant in high income countries and middle income countries but significant only in low income countries. These imply that high income and middle income countries will not import from non-trade partner when they receive more FDI but will import only from countries which are major trade partner. While low income countries will import more from both trade and non-trade partner countries when they receive more FDI. Anyway, we get the same conclusion that it is complementary of FDI and import in East Asian countries.

Table 4.11 Estimated result of export equation

	High Income		Middle Income		Low Income	
	Pool OLS	Fixed Effect	Pool OLS	Fixed Effect	Pool OLS	Fixed Effect
Constant	4.24	-7.59	2.19	8.23	-15.15	-2.39
	(8.32)	-(5.28)	(2.86)	(4.67)	-(7.47)	-(1.05)
GDPi	0.22	1.36	0.32	0.49	2.57	0.96
	(5.97)	(10.09)	(4.06)	(2.16)	(8.41)	(2.70)
GDPj	0.26	0.37	0.26	0.27	0.17	0.21
	(6.84)	(8.26)	(5.67)	(5.92)	(1.81)	(2.75)
Dist	-0.16	-0.17	-0.07	-0.08	-0.11	-0.09
	-(3.50)	-(4.08)	-(1.59)	-(1.77)	-(0.70)	-(0.69)
FDI trade partner	0.28	0.20	0.16	0.16	0.13	0.11
	(13.60)	(8.53)	(7.05)	(6.73)	(7.43)	(3.84)
FDI non trade partner	0.12	0.11	0.17	0.18	0.26	0.23
	(3.48)	(2.33)	(3.44)	(4.11)	(4.61)	(1.67)
Dummy 97	-0.18	-0.10	-0.37	-0.35	-1.67	-0.68
	-(1.40)	-(0.85)	-(3.19)	-(3.09)	-(4.24)	-(1.95)
Number of observations	462	462	408	408	321	321
R2 (adjust)	0.55	0.62	0.48	0.50	0.59	0.73
Durbin-Watson Stat	1.63	1.73	1.29	1.31	2.79	2.68

Table 4.12 Estimated result of import equation

	High Income		Middle Income		Low Income	
	Pool OLS	Fixed Effect	Pool OLS	Fixed Effect	Pool OLS	Fixed Effect
Constant	5.59	-6.90	3.38	6.74	-11.23	-1.66
	(8.06)	-(3.40)	(3.94)	(3.41)	-(5.88)	-(0.71)
GDPi	0.15	1.36	0.28	0.17	2.36	1.08
	(2.96)	(7.12)	(3.25)	(0.65)	(8.17)	(2.88)
GDPj	0.09	0.18	0.21	0.21	0.38	0.39
	(1.76)	(2.92)	(4.06)	(3.99)	(4.26)	(4.77)
Dist	-0.14	-0.15	-0.07	-0.08	-0.49	-0.43
	-(2.23)	-(2.48)	-(1.42)	-(1.49)	-(3.25)	-(3.21)
FDI trade partner	0.38	0.30	0.16	0.16	0.26	0.15
	(13.24)	(8.90)	(6.37)	(6.20)	(8.86)	(6.29)
FDI non trade partner	0.01	0.01	0.08	0.09	0.30	0.18
	(1.49)	(0.81)	(1.44)	(1.69)	(6.06)	(2.97)
Dummy 97	-0.26	-0.17	-0.28	-0.27	-1.91	-1.01
	-(1.47)	-(1.03)	-(2.23)	-(2.15)	-(4.64)	-(2.51)
Number of observations	462	462	408	408	321	321
R2 (adjust	0.55	0.49	0.37	0.37	0.65	0.72
Durbin-Watson Stat	1.78	1.82	1.87	1.88	2.56	2.56

4.3 Summary results from growth model and gravity model

According to the growth model we can see that FDI has a positive relationship with economic growth in high income and middle income countries which have more appropriate economic factors. And from the gravity model, we conclude that FDI can generate host countries' both of exports and imports especially with their trade partners.

By the way, growth model and gravity model cannot tell the impact of FDI on other macroeconomic variables, therefore, we try to use GTAP model which is one type of CGE models to study the impact of FDI in the next chapter.

CHAPTER V
EMPIRICAL STUDY OF IMPACT OF FDI USING GTAP MODEL

5.1 Introduction

As FDI in East Asian countries have come increasingly to see as a source of economic development and modernization, income growth and employment, countries have liberalized their FDI regimes and pursued other policies to attract investment. They have addressed the issue of how best to pursue domestic policies to maximize the benefits of foreign presence in the domestic economy.

The overall benefits of FDI for developing country economies are well documented. Given the appropriate host-country policies and a basic level of development, a preponderance of studies shows that FDI triggers technology spillovers, assists human capital formation, contributes to international trade integration, helps create a more competitive business environment and enhances enterprise development. All of these contribute to higher economic growth, which is the most potent tool for alleviating poverty in developing countries. Moreover, beyond the strictly economic benefits, FDI may help improve environmental and social conditions in the host country by, for example, transferring “cleaner” technologies and leading to more socially responsible corporate policies.

I this part, we will find the impact of FDI on macro economy by using GTAP model. GTAP (Global Trade Analysis Project) is the Computable General Equilibrium model developed by the coordination of Purdue University (U.S.A.), and Monash University (Australia). The GTAP database Release 5 (GTAP-5) exploit the data of the year 1997 covers 66 economic regions of the world, and 57 production sectors for each region. The economic region relate to each other by imports, exports, and international capital movement. This model is accepted as the tool to study the effects of international trade policies.

Theoretically, general equilibrium theory focus the picture of the economy deeply in the micro level of all components, while trying to arrange the network of relationship among those components to be systematically related in order to enter the equilibrium simultaneously. As the analysis framework has been constructed systematically, it is quite clear to follow the effects that are resulted consequently through the chain of the relation, by the change of one or set of policies.

5.2 Model Specification

5.2.1 GTAP structure

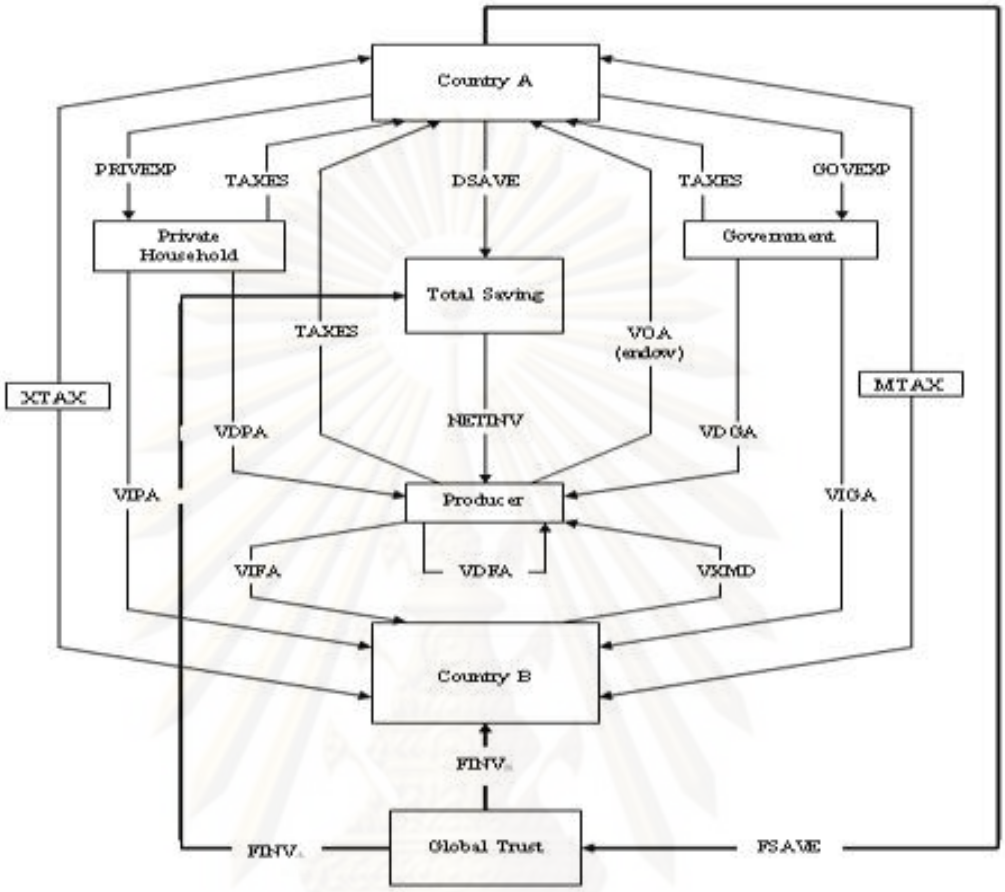
The structure of GTAP model is separated into 3 major parts. First, economic activities of each country are composed of current production, capital creation, consumption, and government expenditure.

Second, in the view of international capital movement, there are one kind of labor and one kind of capital in each country while are mobile among countries. There exist the assumptions that every country will save one portion of their incomes to be savings, as these savings will be arranged into the world savings that will be provided for investments in each country. The proportion of investment among the countries is determined by the rate of return on capital in each country. Lastly, international capital movements occur to equalize the rate of return on capital in the long run.

Third, in the view of international trade, goods of those countries are assumed to be imperfectly substitutable, as that can be substitution between imported and domestic goods, or substitution among imported goods from different exporting countries.

The basic structures of the model display the flow of incomes, expenditures, international trade, and international capital movement. The government policies in each country or the trade agreements can intervene with the production sectors, international trade, and international investment, resulting in the reallocation of domestic and international resources.

Figure 5.1 GTAP Framework



Where

PRIVEXP: Household expenditure

GOVEXP: Government expenditure

DSAVE: Household saving

FSAVE: Foreign saving

FINV: Foreign investment

NETINV: Net investment

VDPA: Value of domestic purchases by private household at agents' prices

VDGA: Value of domestic purchases by government at agents' prices

VOA (endow): Value of output at agents' prices of endowment commodities

VDFA: Value of domestic purchases by firms at agents' prices

VXMD: Value of export at market prices by destination

VIPA: Value if import purchases by private household at agents' prices

VIGA: Value if import purchases by government at agents' prices

VIFA: Value if import purchases by firms at agents' prices

XTAX: Export taxes

MTAX: Import taxes

TAXES: Domestic taxes

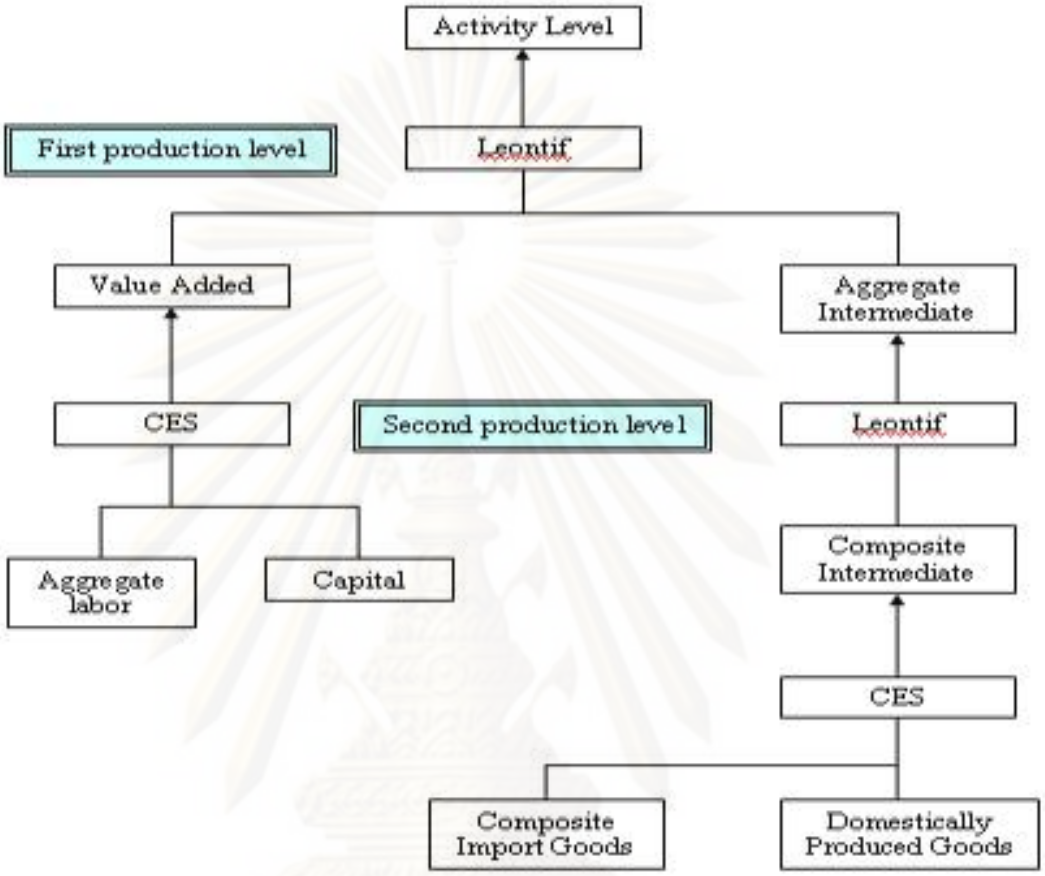
– Production structure

Production structure assumed that the producer produce for the highest profit in the perfective market and production process in each industry is multi-output, multi-input under reparability assumption, and constant elasticity of transformation (CET).

In the production process, the model assumes that producers will produce at the lowest cost under the assumption of constant return to scale (CRS).

- In the first production level, it accommodates Leontif production function that the ratio of total intermediate goods-primary factors is constant.
- In the second level, the primary factors are labors and capitals that are imperfectly substitutable with the constant elasticity of substitution.
- By the way, it is assumes that no substitution between intermediate goods used in the production I that the usage ratio between each intermediate goods is constant (Leontif production).
- Moreover, there is the assumption that the elasticity of substitution of import substitution goods for import goods is constant (CES).

Figure 5.2 Production structure in GTAP model

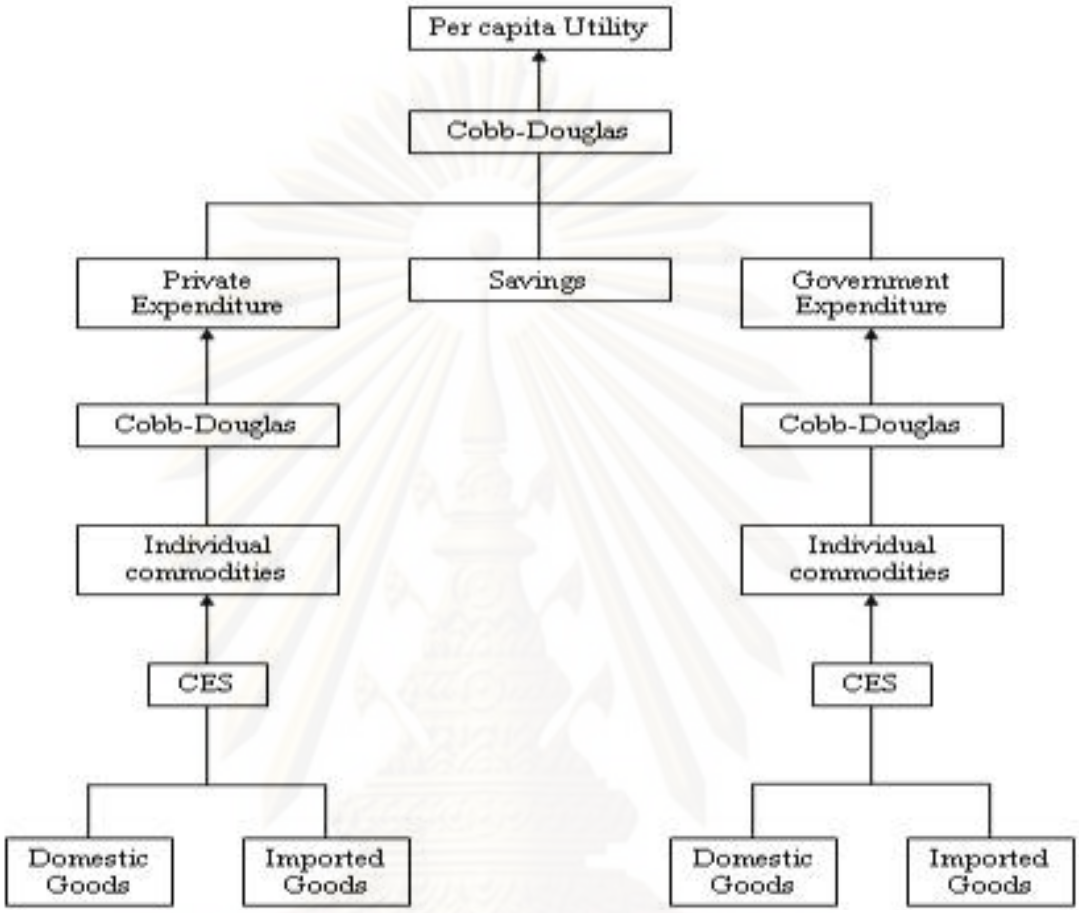


– Household demand structure

In household demand structure, the expenditure for goods is according to that of Stone-Geary that is known as linear expenditure system (LES). The household expenditure will be divided into committed expenditure and other expenditures.

Each kind of composite goods is composed of import goods, and import substitution goods, assuming constant elasticity of substitution (CES).

Figure 5.3 Household demand structures in GTAP Model



– Capital goods demand structure

The demand of capital goods structure is similar to the structure of household demand in that it has level relationship, import substituted raw materials; Leontif function in the first level of capital goods production, and composite goods is CES of import substituted raw materials for imported raw materials at the second level of production.

– Export structure

The CGE model assumes that the export quantities depend on the F.O.B. export prices in the unit of foreign currency, with the elasticity from the study of Francois, McDonald, and Nordstrom (1995).

— Import structure

The import structure has 2 major components that are import for production, and import for consumption. The volumes of both kinds of import depend on the import prices compared with domestic prices, and the total production of the country, with the elasticity of import substitution from the study of Francois, McDonald, and Nordstrom (1995).

— Price determination and movement to equilibrium

From the above assumptions that the market is perfectly competitive, together with open economy, producers can't define the price, as the price is determined by the point that all producers in the economy achieve normal profit. Then the unit price is determined by the marginal cost. The real interest rate is constant, assumed equal to the world real interest rate. The exchange rate has to agree with purchasing power parity (PPP) condition. Furthermore, wage rate can adjust according to the goods prices to maintain the level of real wage.

In term of movement of system equilibrium, the market mechanism is the key player that will locate the point that demand is equal to supply as the condition of equilibrium in the market. The model assumes that the system is at equilibrium all the time according to the assumption of Neo-classical economics.

— Accounting for investment flows in the standard GTAP model

The standard GTAP framework allows users to specify whether the global allocation of investment is fixed or flexible. The former view assumes that the regional composition of capital stocks does not change in response to the policy change, meaning that global and regional net investment move together. As shown by the accounting identity function, provided there is little change in regional savings, fixing the global bank's allocation of investment effectively fixes the trade balance (capital account) for each country/region.

$$S\text{-}I \equiv X\text{-}M+R$$

Identity function states that national savings (S) minus investment (I) is equivalent to the current account, where R is international transfer receipts which are set to zero in the GTAP database (Hertel, 1997).

Alternatively, the allocation of investment across regions can be made flexible, driven by the expected rate of return to capital. Investors are assumed to behave in such as to equate the rate of return across regions. Investment flows to/from a region depend on that region's rate of return to capital relative to the rate prevailing elsewhere. By identity function, an increase in regional investment would be associated with deterioration in the current account and a strengthening of the terms of trade.

Investment in the GTAP model does not come on-line in the simulation period, meaning that the capital stock within an economy is fixed. This outcome is essentially a short run proposition — the simulation period is too short to allow any investment that may affect the stock of capital. GTAP's investment theory does not allow it to be used for true long-run policy analysis (Hanslow et al, 2000).

Plainly, the GTAP model has some limitations for longer-run applications because it does not account for capital and wealth accumulation. The G–Cubed model, which is better equipped than GTAP to incorporate and model changes to financial and capital flows, is better placed to investigate the effects of capital flows and accumulation.

— Capital sector in GTAP

In GTAP, in addition to a number of tradeable commodities, there is a commodity called 'capital goods' CGDS which is not tradeable. While the tradeable commodities correspond to normal definitions of industries and products, CGDS does not. It is a notional sector which does not undertake any real economic activity of its own. It does not employ any primary factors of production (land, labour, capital), and its value-added is therefore zero. The sector is used to combine the various inputs to investment expenditure into one composite commodity, CGDS, which is then purchased

by investors represented in the model by an institution called the global bank. Both imports and domestic goods can be used as inputs into the sector. Because CGDS itself is not tradeable, the amount of CGDS produced in a country must be equal to, and is determined by, the amount demanded by the global bank in that country. The commodity is akin to the 'investment' column of an input/output table rather than one of the productive sectors.

GTAP is a comparative static model. It reduces the dynamic process of capital to the annual snapshot which the database represents. Investment is generally motivated by the possibility of profits in the future. Future profits are represented in the model through the regional household's utility function. Current savings provide utility in the current period precisely because they offer the promise of future returns. These savings translate immediately into investment and hence purchases of capital goods. So money devoted to savings must be spent on the capital good (global S = global I). Implicitly, this treatment is motivated by the recognition that spending on the capital good does provide future benefit. Savings are modeled simply as a fixed proportion of total household income. Total spending on capital goods, therefore, depends only on how incomes change. This means that any changes which may occur to the (global) productivity of capital, agents' rates of time preference, or other factors which may influence decisions on levels of saving cannot be directly represented in the model.

In order to allocate of capital spending across regions, the process decided by the 'global bank'. The bank receives savings inflows from households in all regions, and given the size of these inflows, decides how best to allocate its total funds across regions. It purchases real as opposed to financial assets. In this sense the global bank is somewhat analogous to the aggregate of all multinational corporations deciding where to build new plants plus all the other intermediaries moving capital for investment in real assets.

In the decision-making process of the global bank, GTAP allows for the operation of either of the two processes. The first, and simplest, process involves

preserving the relative shares of global investment which are spent in each region. In this case if total savings goes up by a certain proportion, investment spending in each region will go up by an identical proportion. In the current experiment, this structure is not used, because it does not allow for any change in the relative attractiveness of different regions. The second process which the global bank can use involves maximizing the rate of return on that investment. For present purposes, this is a more suitable process, as it allows the bank to shift investment between regions as they become more or less attractive.

This attractiveness depends on expected returns and risk. As mentioned above, GTAP does not explicitly look forward into the future, and so does not provide a robust basis for determining future returns, and how these may change. To provide a basis for this process, it is hypothesized that expected returns in a given region will fall as the amount of investment undertaken in the present rises (Hertel and Tsigas, 1997). The strength of this relationship depends on the value of the parameter which may vary across regions, but does not in this experiment. Further, it is assumed that the initial distribution of investment represents equilibrium not in the sense that actual rates of return are equalized across all regions, but in the sense that any differences between rates are accountable for by differences in riskiness.

This means that the global bank, when faced with a change in the total amount of money it has to allocate across regions, or a change to the expected rate of return in any region, will adjust the allocation of investment in such a way that risk adjusted rates of return across regions are equalized. This structure turns out to be amenable to modeling a change in the investment climate.

5.2.2 How to shock capital flow in GTAP Model

There are three methodologies to study capital flows in GTAP model (1) risk ratio method, (2) trade balance shock, and (3) direct shock to investment. In this paper, the risk ratio method was chosen over the alternatives because it is a comparatively direct

way of modeling the effect which we wish to analyze. All three methods are described below.

1) Risk ratio method

In GTAP model, investors are represented by single agent, known as global bank. This agent receives savings from households around the world, and invests this savings. Investment in each region is represented by purchase of a commodity called capital goods. The allocation of investment demand across regions is decided by global bank.

The GTAP model allows two processes which effect the decision making of global bank. The first process involves preserving the regional shares of global investment. In this case if total investment changes in a certain proportion, investment spending in each region will change in an identical proportion. The second process which global bank may employ involves maximizing the rate of return on investment. This process is more suitable because it allows the bank to shift investment between regions as they become more or less attractive.

Attractiveness depends on expected future returns and risk. To provide a basis for this process, it is hypothesized that expected returns in a given region will fall as the amount of current investment rises. This relationship depends on the value of the parameter RORFLEX in the model. The global bank, when faced with a change in the total amount of money it has to allocate across regions or a change to expected rate of return in any region, will adjust the allocation of investment in such a way that changes in risk adjusted rates of return across regions are equalized.

We assume that the global bank equalizes expected risk adjusted rate of return, so that risk adjusted rates for all regions are equal to some global average.

RORE(r) / RISK(r) = RORG

Where

RORE(r) is a non risk adjusted expected rate of return

RISK(r) represents the ratio of equilibrium return in region r to the global average rate of return

RORG is a weighted average of returns around the world

We can rewrite as: RORE(r) = RORG * RISK(r); Then by total differentiation and division through by RORE(r) we can obtain

rore(r) = rorg + risk(r)

In standard GTAP model in the case where RORDELTA = 1

rore(r) = rorg + cgdslack(r)

This equation states that the percentage change in the rate of return on investment in region r is equal to the percentage change in global rate of return plus a disequilibrium factor which is generally exogenous and set at zero in a general equilibrium closure. Normally, the cgdslack variable is only non zero when we allow disequilibrium to exist in the market for capital goods. The variable cgdslack can be interpreted to represent a risk premium. So we can shock variable cgdslack(r) in order to find the effect of capital flows in GTAP model.

2) Trade balance shock

An increase in investment in South Africa without a corresponding increase in domestic savings requires an increase in the capital account surplus, and this must be matched by a corresponding increase in the trade account deficit (S – I = X – M). One means of imposing this outcome on the model is to make the trade balance (DTBAL)

exogenous, and to shock this in a negative direction. This is an indirect method of achieving the effect which we wish to model.

However, trade balance cannot be exogenised in a satisfactory way in the present case. Normally, if trade balance is exogenised, either variable saveslack or cgdslack is endogenised. If saveslack is endogenised in this case, then any shock to the trade balance will be reflected in savings. This is not the effect which we wish to have occurred.

If risk premium parameter (cgdslack) is exogenised, then the shock will be reflected in investment. If this is done, however, the closure is no longer a general equlibrium one (walraslack is non-zero). This means that we also need to 'swap' variable walraslack and PSAVE, which in turn leaves us with no numeraire price. A different price can be fixed as the numeraire, but this requires that the market to which price pertains to fail to clear, which is not desirable. Overall this method, while not impossible to implement, has little to recommend it.

3) Direct shock to investment

The most direct way to simulate an increase in capital inflow is to exogenise and positively shock the quantity of capital goods supplied (qcgds). To do this creates a similar problem to that encountered in implementing the trade balance method, however: When this is done, walraslack is non-zero, and so psave is endogenised. After this, the model has difficulty solving, presumably because of the lack of a numeraire price. Consequently this does not appear to be an attractive method.

5.2.3 Simulation scenario

In this paper, in order to study the impact of increasing in investment flows, we use risk ratio method by decrease risk premium in host countries 1% to increase more investment and we also increase technology of factor input 3% in host countries to capture the effect of technology transfer which come from capital flows. We will focus on impacts of FDI to GDP, welfare, and their components. In GTAP model, economic well-

being depends in part on disposable income, which can be divided into its component (GDP, depreciation and net income payments to foreigners). Decomposition along these lines leads to the following welfare contributions (Hanslow, 2000):

- endowment contributions to welfare, which arise from changes in the availability of primary factors, such as increases in the stock of machinery, buildings and agricultural land;
- technical efficiency contributions, which arise from changes in the use of available inputs in production, such as improvements in labor productivity;
- allocative efficiency contributions, which arise when the allocation of resources changes relative to pre-existing distortions
- financial effects, which define it as the sum of the capital earnings and foreign inflows effects net of the foreign out flows effect.

5.2.4 Data aggregation

In this study, we use a 14 region and 3 commodity aggregation of the GTAP data base. The regions and commodities are as follows:

Regions

- China
- Hong Kong
- India
- Indonesia
- Japan
- Korea
- Malaysia
- Philippines
- Singapore
- Taiwan
- Thailand
- Vietnam
- Rest of South East Asia
- Rest of the World

Commodities

- Food & Agriculture
- Manufacture
- Services

5.3 Empirical results of effect capital flows using GTAP model

The immediate effect of a negative shock to risk premium parameter (cgdslack) is to increase the value of the ratio RORE/ RP. Equilibrium requires that this ratio remain unchanged, and equal to the global average risk-adjusted rate of return RORG. Because the risk ratio RP is exogenous, the expected rate of return RORE in host country must fall. Because of the assumption built into the model that the expected rate of return is inversely related to the level of investment, this is achieved by increasing the amount of investment in host countries. Intuitively this is just the result we would expect. The result of the experiment is that the quantity of investment goods produced increases in all countries, see table 5.1. Countries which investment goods increase highest is Japan with 9.53% change in quantity and follow by 9.03% of Malaysia and 8.18% of Thailand.

To achieve the increase in capital goods output, it is necessary to increase the purchases of inputs in capital goods sector. Table 5.2 shows where these inputs will come from by examining the pre-shock inputs into East Asian's capital goods sector. From this table, for all countries, total capital inputs are highest used in services sector and follow by manufacturing sector. Service sectors are almost entirely domestically sourced while manufactures come in from foreign sources more than domestic source except Japan, Korea, China, and India.

Table 5.1 Capital Goods Sector in East Asian

(US$ bn)	Gross Investment		Depreciation		Net Investment		Change in Quantity (%)
	Pre-shock	Post-shock	Pre-shock	Post-shock	Pre-shock	Post-shock	
Japan	1,059.7	1,176.4	602.7	611.7	457.0	564.7	9.53
Korea	109.9	116.6	50.7	50.6	59.3	66.0	6.18
Taiwan	51.5	54.0	21.2	21.2	30.3	32.8	5.03
Hong Kong	47.2	49.2	18.0	17.9	29.2	31.3	4.57
Singapore	30.0	30.9	9.9	9.9	20.1	21.0	3.37
China	408.8	423.2	109.5	109.2	299.3	314.0	3.83
India	106.1	111.8	40.7	40.8	65.4	71.0	5.11
Indonesia	23.4	24.8	12.4	12.4	11.0	12.4	6.22
Malaysia	12.9	14.1	10.2	10.2	2.8	3.9	9.05
Philippines	14.0	14.9	7.6	7.6	6.4	7.3	6.61
Thailand	23.1	25.0	15.3	15.3	7.9	9.7	8.18
Vietnam	12.7	13.2	3.6	3.6	9.1	9.6	3.98
Rest of South East Asia	19.1	20.4	8.7	8.8	10.4	11.7	6.02

Table 2. Pre-shock Sources of Inputs to Capital Goods Industries (US$ bn)

	Food & Agriculture			Manufactures			Services		
	Domestic	Imported	Total	Domestic	Imported	Total	Domestic	Imported	Total
Japan	0.1	0.1	0.2	24.5	4.9	29.3	70.0	0.5	70.5
Korea	0.1	0.1	0.2	22.7	16.7	39.4	59.7	0.7	60.4
Taiwan	0.4	0.0	0.4	18.1	33.8	51.9	47.1	0.6	47.7
Hong Kong	0.1	0.0	0.1	4.9	17.9	22.8	75.1	2.0	77.1
Singapore	0.0	0.0	0.0	6.2	53.4	59.6	40.4	0.0	40.4
China	2.2	0.1	2.3	22.9	7.9	30.8	66.6	0.3	67.0
India	0.7	0.0	0.7	36.7	9.0	45.7	53.6	0.0	53.6
Indonesia	0.0	0.0	0.1	6.8	20.9	27.7	70.3	1.9	72.2
Malaysia	0.1	0.0	0.2	4.4	56.2	60.7	33.2	5.9	39.2
Philippines	3.5	0.0	3.5	6.0	37.1	43.0	50.1	3.4	53.5
Thailand	0.0	0.3	0.3	16.3	35.7	52.0	46.6	1.1	47.7
Vietnam	0.1	0.0	0.1	5.2	20.0	25.2	70.8	3.9	74.7
Rest of South East Asia	0.0	0.0	0.0	22.7	5.5	28.1	71.6	0.2	71.9

Because, in GTAP model, the capital goods industry does not substitute between different intermediate inputs, therefore, the percentage growth in demand for input from each sector will increase by the same amount as the growth in output of capital goods. The volume changes of inputs into the capital goods industry in East Asia are also shown in table 5.3. The direct result of growth in the capital goods industry is an increase in demand for domestic services and manufactures, and also an increase in demand for imported manufactures. How each of the two sectors is affected depends on the proportion of its output which goes to the capital goods sector.

Table 5.4 shows the proportions of output of each commodity which are sold to each different type of user. The second column of each commodity shows the share of each commodity's output which goes to the capital goods sector. From this table, expansion of the capital goods sector has no direct effect on the other sectors except service sectors. Expansion of the services and manufactures will require that these two sectors purchase more primary factors. Table 5.5 shows the direct factor intensities in East Asian industries prior to the shock.

Table 5.3 Capital Goods Sector Input: Volume Changes (US$m)

	Food & Agriculture			Manufactures			Services		
	Domestic	Imported	Total	Domestic	Imported	Total	Domestic	Imported	Total
Japan	72.6	89.4	162.0	21,197.2	7,565.5	28,762.7	68,478.7	703.2	69,181.9
Korea	9.9	5.6	15.5	1,517.6	1,088.2	2,605.8	3,951.0	45.5	3,996.5
Taiwan	9.7	-	9.7	514.9	825.5	1,340.4	1,219.6	12.9	1,232.5
Hong Kong	1.3	0.5	1.8	130.9	360.6	491.5	1,627.6	35.3	1,662.9
Singapore	0.2	-	0.2	78.6	503.7	582.3	395.0	0.1	395.1
China	345.2	8.8	354.0	3,757.7	1,060.2	4,817.9	10,435.6	41.6	10,477.2
India	36.9	0.1	37.0	1,916.6	564.9	2,481.5	2,907.0	1.5	2,908.5
Indonesia	0.5	0.4	0.9	105.4	297.4	402.8	1,023.3	26.3	1,049.6
Malaysia	1.6	0.4	2.0	58.7	651.3	710.0	395.5	63.0	458.5
Philippines	32.2	-	32.2	57.0	341.4	398.4	465.3	30.3	495.6
Thailand	-	4.9	4.9	321.3	663.8	985.1	883.0	19.9	902.9
Vietnam	0.6	-	0.6	28.6	99.0	127.6	360.1	17.9	378.0
Rest of South East Asia	0.1	0.1	0.2	231.9	90.1	322.0	819.3	3.3	822.6

Table 5.4 Disposition of Output of East Asian Industries (%)

	Food & Agriculture			Manufactures			Services		
	Domestic	CGDS	Export	Domestic	CGDS	Export	Domestic	CGDS	Export
Japan	99.1	-	0.9	80.9	-	19.1	98.6	0.5	0.8
Korea	96.4	-	3.6	62.6	-	37.4	93.2	3.1	3.7
Taiwan	93.9	-	6.1	52.6	-	47.4	95.1	0.7	4.2
Hong Kong	98.4	-	1.6	60.6	-	39.4	74.9	2.4	22.7
Singapore	42.6	-	57.4	16.6	-	83.4	76.9	4.7	18.3
China	96.3	-	3.7	78.8	-	21.2	97.3	0.4	2.3
India	96.1	-	3.9	84.5	-	15.5	96.4	0.5	3.1
Indonesia	78.3	-	21.7	53.6	-	46.4	95.6	0.5	3.9
Malaysia	54.5	-	45.5	26.4	-	73.6	65.4	3.8	30.8
Philippines	93.8	-	6.2	35.9	-	64.1	94.8	1.0	4.2
Thailand	71.6	-	28.4	48.6	-	51.4	88.7	1.0	10.4
Vietnam	67.9	-	32.1	54.0	-	46.0	92.7	1.0	6.3
Rest of South East Asia	85.0	-	15.0	90.2	-	9.8	98.4	0.1	1.4

Table 5.5 Direct Factor Intensities in East Asian (%)

	Food & Agriculture					Manufactures				
	Land	UnSkLab	SkLab	Capital	NatRes	Land	UnSkLab	SkLab	Capital	NatRes
Japan	5.3	40.1	11.1	40	3.5	0	38.2	22.4	39.3	0
Korea	32.4	36.4	2.9	25.4	2.9	0	34.9	11.1	54	0
Taiwan	16.6	45.4	7.7	24.6	5.7	0	43.4	15.5	41.1	0
Hong Kong	6.3	23.7	6.7	49.5	13.8	0	37.6	21	41.4	0
Singapore	6.7	29.3	8.6	52.7	2.7	0	29.9	13.5	56.6	0
China	18.5	52.2	1.7	20.6	7	0	43.4	7.7	49	0
India	32.7	38.5	1.4	24.3	3.2	0	35.4	5.8	58.8	0
Indonesia	16.6	23.2	1.7	46.5	12	0	26.7	6.7	66.6	0
Malaysia	7.3	22.7	2	49.5	18.5	0	44.2	10.1	45.7	0
Philippines	22.7	35.4	1.3	36.3	4.3	0	13.7	2.6	83.7	0
Thailand	27.3	31.1	1.3	33.8	6.4	0	23.8	4.5	71.7	0
Vietnam	27.7	35.1	1.8	22.4	13	0	51.9	8.5	39.6	0
Rest of South East Asia	21.9	29.2	1.7	37.2	10	0	28.9	5.1	66.1	0

Table 5.5 Direct Factor Intensities in East Asian, (Cont.)

	Services				
	Land	UnSkLab	SkLab	Capital	NatRes
Japan	0	37.9456	23.981	38.073	0
Korea	0	34.8604	17.507	47.633	0
Taiwan	0	29.994	29.024	40.982	0
Hong Kong	0	24.12	20.496	55.385	0
Singapore	0	30.4625	20.58	48.958	0
China	0	40.2636	19.719	40.018	0
India	0	31.9763	17.412	50.611	0
Indonesia	0	26.487	11.948	61.565	0
Malaysia	0	38.7521	17.971	43.277	0
Philippines	0	19.3939	16.225	64.381	0
Thailand	0	19.2719	12.768	67.96	0
Vietnam	0	30.1353	9.7941	60.071	0
Rest of South East Asia	0	23.1891	13.729	63.082	0

For all countries, all sectors use capital and unskilled labor intensively compared to other factors. Neither sector uses land, and natural resources except food & agriculture sector. Both of these sectors provide very little input into the capital goods sector, and so there will be no direct effects on the factor prices of land or natural resources. This means that the direct effects of the shock will put most upward pressure on wages of unskilled labor and price of capital, see table 5.6.

Table 5.6 Changes in Factor Prices%

	Land	UnSkLab	SkLab	Capital	NatRes
Japan	0.9	4.8	4.8	4.7	0.9
Korea	1.6	2.9	3.0	2.9	1.6
Taiwan	1.1	2.5	2.7	2.6	1.1
Hong Kong	2.7	2.4	2.4	2.4	2.7
Singapore	3.1	1.7	1.7	1.7	3.1
China	2.2	2.6	2.8	2.6	2.2
India	1.9	3.3	3.6	3.4	1.9
Indonesia	2.1	2.8	3.0	2.8	2.1
Malaysia	3.0	2.2	2.3	2.3	3.0
Philippines	2.4	2.8	3.1	2.7	2.4
Thailand	2.2	2.7	2.9	2.7	2.2
Vietnam	1.9	2.7	2.8	2.8	1.9
Rest of South East Asia	0.9	4.0	4.5	4.2	0.9

Because of the increase in demand for these goods, output prices for manufactures and services will rise. Output prices of other industries will also be affected by the changes in factor prices. Because, in this model, industries operate under zero-profit conditions, any increase in input prices is reflected in output prices. However, in this study, we assume that capital flows can increase technology of production through the process of technology transfer; therefore, we increase host

country's input technology. Because of that, output prices of all sectors in host country tend to fall except Japan, see table 5.7.

Table 5.7 Output Price Effects

	Food & Agriculture	Manufacture	Service	CGDS
Japan	1.3	1.5	1.7	1.5
Korea	-0.3	-0.1	-0.1	-0.1
Taiwan	-0.5	-0.3	-0.4	-0.2
Hong Kong	-0.5	-0.4	-0.5	-0.4
Singapore	-0.5	-0.3	-0.9	-0.4
China	-0.4	-0.3	-0.3	-0.3
India	-0.1	0.2	0.3	0.3
Indonesia	-0.4	-0.2	-0.2	-0.2
Malaysia	-0.5	-0.4	-0.5	-0.2
Philippines	-0.3	-0.1	-0.2	-0.1
Thailand	-0.3	-0.1	-0.2	-0.1
Vietnam	-0.4	-0.1	-0.2	-0.1
Rest of South East Asia	0.3	1.0	1.1	1.0

Due to changing in the output prices of products in host countries, all tradeable commodities which compete with commodities produced elsewhere will affect by increase in price-competitiveness. Decrease in price will result in increase demand. The extent to which each industry is positively affected by price fall depends in large part on the extent to which it is exposed to competition from foreign-sourced goods.

In GTAP model, firstly, consumers will determine the proportion of total demand for a good which will be imported, and secondly, they will choose the proportions of imported goods which will come from each different source. Because of this structure, the elasticity of demand for domestically-produced goods will generally lower than the elasticity of demand for imported goods from a particular source.

Table 5.8 Trade Exposure of East Asian Industries (as % of domestic output)

	Food & Agriculture			Manufactures			Services		
	Exports	Imports	Total	Exports	Imports	Total	Exports	Imports	Total
Japan	1.2	30.4	31.6	130.3	74.0	204.3	20.7	27.0	47.8
Korea	1.8	22.4	24.2	101.5	65.2	166.7	21.0	17.7	38.6
Taiwan	2.1	14.6	16.7	119.1	86.1	205.2	14.0	12.9	26.8
Hong Kong	0.6	12.5	13.1	31.1	129.8	160.9	128.4	31.8	160.2
Singapore	2.7	9.6	12.3	77.2	87.6	164.9	24.6	14.0	38.6
China	7.6	10.2	17.8	121.4	76.0	197.4	9.4	14.0	23.4
India	13.3	27.6	41.0	65.7	54.3	119.9	23.6	19.1	42.7
Indonesia	50.5	15.8	66.4	127.1	78.6	205.7	13.1	30.9	43.9
Malaysia	16.1	8.3	24.3	130.4	82.1	212.5	33.6	17.4	50.9
Philippines	6.7	16.4	23.1	84.8	85.9	170.6	7.7	9.6	17.3
Thailand	20.2	16.4	36.6	97.5	77.7	175.2	19.2	13.5	32.7
Vietnam	27.0	7.7	34.7	40.4	70.9	111.3	12.1	48.1	60.2
Rest of South East Asia	66.0	16.3	82.3	71.9	90.8	162.7	21.4	15.8	37.2

By examining the elasticities of substitution, which vary between commodities, elasticities of substitution between the domestic commodity and the bundle of imported commodites (ESUBD) are shown in table 5.9. Demand for exports can break up into many different sources. In order to determine overall export elasticities, it is necessary to run a simulation. However, for a relatively small country, the elasticities of demand facing exports will be approximately equal to the parameter ESUBM, which is set at twice the level of ESUBD.

Table 5.9 Elasticities of Substitution for Domestic Commodities

	Elasticities of Subsitution
Food & Agriculture	3.0
Manufactures	3.5
Services	1.9

Overall, therefore, the extent to which output in each East Asian industry rises depends on three factors: how much the price of the commodity decline; how exposed to foreign competition the commodity is; and whether this exposure is predominantly on the domestic market or overseas. The commodities with the greatest price decline are services and manufacturing, while the commodities most exposed to trade are manufactures (see table 5.8).

As show in table 5.6, higher factor prices provide the regional household (which owns these factors) with a higher level of nominal income. Moreover, output prices in the host economy will also tend to decrease, see table 5.7, which means that household's real income level will also rise. As a result, demand for consumption and saving of households will increase (in value terms, demand for consumption goods and savings will increase by the same proportion, because of the Cobb-Douglas utility function). This effect favors those industries where income elasticities of demand are highest.

We have already considered what changes will occur to the capital goods sector, foreign consumers, and domestic final consumers. We now need to consider how domestic intermediate input demand changes.

As noted above, GTAP does not allow substitution between different intermediate inputs. Consequently, the demand for agricultural output by the food processing industry will always change by the same proportion as does the output of the food processing industry (although the share of this demand satisfied by domestically-produced agricultural goods can change). Intermediate demand for any commodity, therefore, will depend on how well the downstream industries do. For example, if the food processing industries increase their production, the intermediate demand for agricultural goods by the food processing industries will increase. To get an idea of exposure of different commodities to changes in production levels and consequent in intermediate demand, we can first look at how great a share of total demand for each commodity comes from other industries (see table 5.4). We can then examine the pattern of intermediate demands across industries. Table 5.10 shows that, in general, a share of the output of most industries is re-sold to firms in the same industry.

Table 5.10 Intermediate Demand Shares (% of domestic product)

	Food & Agriculture				Manufactures				Services			
	F&A	Manf	Serv	Cgds	F&A	Manf	Serv	Cgds	F&A	Manf	Serv	Cgds
Japan	2.4	0.3	1.3	0.0	0.9	19.7	10.6	6.3	2.1	10.9	27.6	18.0
Korea	4.6	0.4	2.1	0.0	1.1	29.7	9.6	4.7	1.5	11.6	22.3	12.4
Taiwan	4.1	0.5	0.4	0.1	0.8	31.8	9.1	3.6	2.5	15.7	22.2	9.3
Hong Kong	4.8	0.8	2.1	0.0	0.3	2.8	4.7	1.0	1.2	5.9	61.0	15.5
Singapore	0.8	0.0	0.7	0.0	0.6	9.4	9.1	2.7	1.2	12.1	45.9	17.3
China	7.9	4.9	1.9	0.4	2.9	32.8	13.1	4.4	2.3	8.3	8.5	12.7
India	8.7	3.6	2.8	0.2	2.2	17.5	10.1	8.6	5.9	12.6	15.5	12.5
Indonesia	14.1	8.8	5.0	0.0	2.8	16.2	10.2	1.2	5.0	10.2	14.1	12.3

Table 5.10 Intermediate Demand Shares (Cont.)

	Food & Agriculture				Manufactures				Services			
	F&A	Manf	Serv	Cgds	F&A	Manf	Serv	Cgds	F&A	Manf	Serv	Cgds
Malaysia	5.2	8.1	1.6	0.0	1.2	24.8	10.0	0.7	2.8	20.2	19.7	5.5
Philippines	24.6	2.1	1.7	0.9	2.2	13.1	10.2	1.5	4.5	8.2	18.7	12.4
Thailand	10.8	2.7	4.9	0.0	1.9	19.9	10.5	3.4	4.7	13.5	17.8	9.8
Vietnam	13.8	3.1	3.8	0.1	2.1	9.3	13.1	2.3	6.2	10.1	5.6	30.7
Rest of South East Asia	8.4	2.1	4.4	0.0	1.2	16.7	10.0	5.8	4.1	9.1	19.7	18.4

Consider the effect on trade balance; in a general equilibrium closure of GTAP, the identity S-I=X-M must hold. Changes in the capital account must be offset by changes in the current account. In this study, the results show that both savings and investment increase, but the increase in investment is much larger, as this is a direct effect of the shock. This means that the balance of trade must worse. This may be caused by a rise in imports, a fall in exports or a combination of both.

By the way, we assume that factor input technology increase by the process of technology transfer. This shock reduce price of output. Therefore, host countries' export will increase. We can see from table 5.11 that both imports and exports rise except Japan. However, most countries increase their imports more than exports, therefore, in general, trade balance will get worse.

Table 5.11 Changes in Trade Flows (US$ mn)

	Food & Agriculture						
	Exports			Imports			Trade
	Pre	Post	Change	Pre	Post	Change	Balance
Japan	3,820.0	3,323.1	- 496.9	95,605.8	99,135.5	3,529.7	- 4,026.6
Korea	2,704.4	2,756.2	51.8	34,611.3	35,221.6	610.3	- 558.5
Taiwan	2,114.6	2,179.5	64.9	15,022.9	15,275.9	253.0	- 188.1
Hong Kong	370.4	381.6	11.2	8,236.6	8,362.6	126.0	- 114.8
Singapore	2,988.5	3,090.5	102.0	10,761.0	10,991.6	230.6	- 128.6
China	21,247.0	21,633.6	386.6	28,646.3	29,184.6	538.3	- 151.7
India	8,226.7	8,232.6	5.9	17,038.6	17,463.5	424.9	- 419.0
Indonesia	18,316.2	18,721.5	405.3	5,740.9	5,831.0	90.1	315.2
Malaysia	11,446.9	11,762.8	315.9	5,872.2	5,987.6	115.4	200.5
Philippines	2,611.4	2,657.0	45.6	6,417.3	6,528.0	110.7	- 65.1
Thailand	11,959.4	12,205.4	246.0	9,747.2	9,931.2	184.0	62.0
Vietnam	5,358.2	5,482.8	124.6	1,527.9	1,553.9	26.0	98.6
Rest of South East Asia	3,604.8	3,526.7	- 78.1	891.3	923.3	32.0	- 110.1

Table 5.11 Changes in Trade Flows (Cont.)

	Manufacture						
	Exports			Imports			Trade
	Pre	Post	Change	Pre	Post	Change	Balance
Japan	409,410.8	362,575.1	- 46,835.7	232,569.0	251,682.5	19,113.5	- 65,949.2
Korea	156,712.6	157,044.1	331.5	100,672.9	103,284.3	2,611.4	- 2,279.9
Taiwan	122,498.0	124,079.7	1,581.7	88,513.6	90,650.3	2,136.7	- 555.0
Hong Kong	20,422.3	20,878.5	456.2	85,286.7	87,525.5	2,238.8	- 1,782.6
Singapore	86,399.8	88,017.4	1,617.6	98,023.5	100,459.0	2,435.5	- 817.9
China	340,774.1	344,134.6	3,360.5	213,277.6	218,277.1	4,999.5	- 1,639.0
India	40,472.8	39,765.6	- 707.2	33,453.2	34,856.1	1,402.9	- 2,110.1
Indonesia	46,065.9	46,504.6	438.7	28,489.7	29,320.9	831.2	- 392.5
Malaysia	92,810.8	94,757.6	1,946.8	58,436.5	60,296.9	1,860.4	86.4
Philippines	33,192.1	33,336.6	144.5	33,620.6	34,465.0	844.4	- 699.9
Thailand	57,882.4	58,321.5	439.1	46,119.5	47,536.3	1,416.8	- 977.7
Vietnam	8,017.0	8,071.1	54.1	14,064.9	14,467.3	402.4	- 348.3
Rest of South East Asia	3,928.4	3,704.1	- 224.3	4,956.1	5,249.4	293.3	- 517.6

Table 5.11 Changes in Trade Flows (Cont.)

	Services						
	Exports			Imports			Trade
	Pre	Post	Change	Pre	Post	Change	Balance
Japan	39,791.5	36,971.5	- 2,820.0	84,888.4	91,236.5	6,348.1	- 9,168.1
Korea	17,761.6	17,784.8	23.2	27,294.4	28,168.7	874.3	- 851.1
Taiwan	12,231.0	12,345.2	114.2	13,229.8	13,573.1	343.3	- 229.1
Hong Kong	76,489.9	77,405.2	915.3	20,882.2	21,372.7	490.5	424.8
Singapore	21,900.6	22,437.3	536.7	15,682.3	15,942.2	259.9	276.8
China	22,457.5	22,576.8	119.3	39,308.4	40,419.6	1,111.2	- 991.9
India	12,425.9	12,284.6	- 141.3	11,802.8	12,279.4	476.6	- 617.9
Indonesia	4,167.7	4,189.3	21.6	11,184.4	11,516.6	332.2	- 310.6
Malaysia	21,269.7	21,577.4	307.7	12,374.4	12,703.8	329.4	- 21.7
Philippines	2,442.3	2,452.7	10.4	3,740.1	3,862.2	122.1	- 111.7
Thailand	10,424.9	10,488.5	63.6	8,010.7	8,244.9	234.2	- 170.6
Vietnam	2,084.4	2,095.1	10.7	9,542.7	9,803.8	261.1	- 250.4
Rest of South East Asia	1,064.5	1,031.6	- 32.9	862.1	908.5	46.4	- 79.3

Finally, we now consider the effect on GDP and welfare. As we discuss earlier, decrease in risk premium make an increasing in investment in host countries. Increase in investment due to increase in price of factors input. However, capital flows also increase technology of production through the technology transfer process and output price will decrease. The process of increasing in price of factors input (wage) and decreasing in output prices make an increase in domestic consumptions and imports. Decreasing in output prices also make host countries receive higher price-competitiveness and can export more goods and services. Anyway, in this study, most countries increase their exports except Japan and India. These may because outputs in Japan and India are used domestically than export.

Table 5.13 Effects on GDP

	cons	inv	gov	x	m	GDP
Japan	5.14	11.02	5.47	-10.5	7.02	4.71
Korea	3.14	6.09	3.45	0.21	2.52	2.85
Taiwan	2.72	4.81	2.96	1.27	2.34	2.57
Hong Kong	2.66	4.19	2.87	1.32	2.50	2.37
Singapore	1.99	2.99	2.11	1.93	2.35	1.75
China	2.84	3.53	2.95	1.00	2.36	2.59
India	3.46	5.37	3.69	-1.33	3.70	3.25
Indonesia	2.94	6.06	3.02	1.25	2.76	2.70
Malaysia	2.61	8.85	2.64	2.01	3.01	2.31
Philippines	2.92	6.52	2.98	0.52	2.46	2.61
Thailand	3.11	8.05	3.16	0.92	2.87	2.69
Vietnam	2.97	3.84	3.04	1.20	2.74	2.63
Rest of South East Asia	4.33	7.00	4.39	1.85	5.54	3.98

Consider the effects on welfare; the largest welfare effect in this study arises from the increase in demand for capital goods on the part of the global bank. This will increase income in host country which also increases in its utility.

From table 5.13, it shows that total welfare increases in all countries. The major source of welfare gain come from an increase in technology of production and follow with the allocative effect. For technological welfare effect, because we assume that input technology in host country increase by 3%, host country will gain the technological effect in the largest proportion compare to other effects. Country which gains the highest benefit from technology effect is Japan; follow by China, India, and Korea. Allocative efficiency welfare effects will arise if the pattern of economic activity is shifted away from or towards relatively distorted activities. Without information on the pattern of distortions, there is difficult to explain the allocative gains in this experiment.

The impacts on terms of trade are in principle ambiguous; there are impacts from exports and imports. As shown earlier, export volumes increase, which generates a positive terms of trade effect, while import volumes increase, which generates a negative terms of trade effect. By the way, the results show that, in general, imports in host country increase more than exports. This will generate negative in term of trade effect in all countries. Factor endowments and population levels do not change in this experiment, so no welfare changes will come from these sources.

Table 5.13 Welfare Effects

	alloc	endw	tech	pop	tot	IS	Total
Japan	17,031.2		108,578.1		9,577.8	- 942.1	134,245.0
Korea	1,324.8		11,452.6		- 98.9	13.2	12,691.7
Taiwan	617.7		7,781.8		- 337.0	43.1	8,105.6
Hong Kong	5.0		4,878.2		- 482.2	- 32.7	4,368.2
Singapore	298.9		2,247.3		- 540.4	- 28.1	1,977.8
China	5,527.2		28,902.0		- 860.8	179.9	33,748.3
India	1,238.5		13,237.6		- 167.9	- 2.9	14,641.1
Indonesia	241.8		4,098.5		- 151.6	32.9	4,221.6
Malaysia	109.2		2,528.7		- 507.0	89.9	2,220.7
Philippines	228.4		1,801.4		- 36.3	- 4.4	1,989.1
Thailand	440.6		2,962.3		- 140.4	20.8	3,283.2
Vietnam	119.1		840.8		- 32.9	- 12.6	914.4
Rest of South East Asia	197.1		2,176.6		62.2	- 19.7	2,416.2

5.4 Summary results from GTAP Model

Comparing the result from all countries groups in table 5.13, it reveals that GDP and welfare increase in all countries; follow by high income countries and middle income countries. In high income countries, Japan receives highest benefit from capital flows and follows by Korea. In middle income countries, China receives highest benefits and follows by India. However, GTAP model based on classical assumption with full employment equilibrium. In a general equilibrium closure of GTAP model, the identity S-I=X-M must hold. Therefore, changes in the capital account must be offset by changes in the current account. This means that the balance of trade usually be worse if we didn't increase factors input technology in host countries.

Moreover, the influence of changes in investment will be display on the demand side: the trade balance changes, and the pattern of domestic demand changes. In this case, GTAP is not well-suited to assessing the long run impacts of capital flows because, in the long run, the most important effects are on the size of the capital stock and on productivity, which are not captured by the GTAP framework.

Table 5.13 Change in GDP and welfare

	GDP	Welfare
Japan	4.7	134,245.0
Korea	2.9	12,691.7
Taiwan	2.6	8,105.6
Hong Kong	2.4	4,368.2
Singapore	1.7	1,977.8
China	2.6	33,748.3
India	3.2	14,641.1
Indonesia	2.7	4,221.6
Malaysia	2.3	2,220.7
Philippines	2.6	1,989.1
Thailand	2.7	3,283.2
Vietnam	2.6	914.4
Rest of South East Asia	4.0	2,416.2

CHAPTER VI
EMPIRICAL STUDY OF IMPACT OF FDI USING CAM MODEL OF WORLD ECONOMY

6.1 Introduction

CAM model of the world is model developed by "State of the World Economy" (SoWE) which is a research programme organized by the Cambridge Endowment for Research in Finance (CERF) and the Alphametrics group and a number of other participating institutions[13]. The SoWE programme aims to develop an integrated accounting and modeling framework for the world economy viewed as an endogenous system. This framework should identify sources of financial and real imbalances and trace the impact that market driven mechanisms and policies originating in different blocs have on the system as a whole and on each other bloc.

The central motivation for this programme stems from two principal observations. First, the scale and characteristics of current global macroeconomic problems are unlike anything experienced in the past and second, that these problems can only be satisfactorily analyzed using a multi-dimensional approach that combines financial, economic, demographic and social aspects.

The uniqueness of the current situation arises from liberalization of trade and international finance that has resulted in unprecedented financial flows and a massive accumulation of external assets and liabilities over the past ten years. In the new context with truly international capital markets adjustments of interest rates and exchange rates are problematic and may have perverse effects at the national level. For example, contractionary monetary policies may attract capital inflows leading to asset

[13] CERF oversees the programme and prepares analyses and research papers. Alphametrics, a research consultancy based in Brussels, Royston (UK) and Saraburi (Thailand), provides data processing services and global scenarios. Both parties work closely with research partners and sponsors.

appreciation; exchange rate changes may have large effects on the value of external assets and liabilities, making it difficult to rely on them to balance current accounts; etc.

Globalization has been highly beneficial for a large proportion of the world's population but the impact has been adverse or much less favorable for a sizeable minority. Moreover new risks have emerged which concern people in all countries including those that have benefited the most.

Although international institutions and research groups pay considerable attention to particular aspects of the global economy there is no established framework that integrates analysis in different fields. Economists have focused attention on financial markets, trade negotiators look at the effects of changes in tariffs, logistics and other factors influencing competition and the location of production, environmentalists consider physical supply and use of energy and other natural resources while institutions charged with responsibility for human welfare examine demographics, health, employment and other indicators of well-being.

The purpose of the SoWE programme is to enable these different aspects to be considered together by developing a common framework of data, models and scenarios that may be examined and refined from the perspective of different countries and regions. Starting with income, population, trade and energy, the framework will be extended progressively to include financial market linkages, the role of government budgets and private borrowing, and trends in sectoral employment and productivity. The SoWE research programme is designed to promote analysis of these and other global policy issues by providing data and macro-models that can be used to examine recent history and generate alternative scenarios of potential future developments.

The methodology of this model is designed to support analysis of macro-economic developments and the possible impact of policy changes at an aggregate level of individual countries. The SoWe database and models support a ‘variable geometry’ approach allowing researchers to focus on regional and global relationships affecting specific countries or country groups. Annual time series covering the past 35 years are analysed using structural models to identify historical trends and disturbances

changes in trend as a basis for projecting alternative scenarios up to 10 years into the future. The core data and models can be extended to incorporate more detailed models of individual countries or regions.

Each exercise starts with a 'base scenario' projecting the implications of a continuation of current trends and policies into the future. This inevitably reveals potential developments that make indefinite continuation of current trends implausible or undesirable.

Variant scenarios explore the potential consequences of policy responses to implausible or undesirable developments in the base scenario or changes intended to improve the outcome for some or all blocs. Given the high degree of interdependence implied by current and prospective levels of trade, the results generated by variant scenarios are often not those that would be expected on the basis of focusing on bilateral relationships alone, which all too frequently, and misleadingly, is the focus of official organizations charged with monitoring global developments.

Construction of scenarios is facilitated by a multivariate target-instrument computational process. Variant scenarios are typically defined by specifying target values for a set of endogenous variables, implying modification of a corresponding number of exogenous variables or structural relationships. Variant scenarios may also be used to examine the sensitivity of the model to various assumptions (impact of changes in assumptions regarding parameter values, trends and residuals).

6.2 Data and source

The data of this model covers with 127 countries which can group into country groups and it provides annual time series of national accounts, balance of payments, international trade, interest rates, exchange rates, inflation, exchange reserves, government sector, and energy production from the yeas 1970 to 2007. All data in this model are collected from the UN Statistics Division and the International Monetary Fund.

All data are divided into 5 groups, trade, balance of payments, national accounts, energy, and prices. The raw data in trade group are composed of exports and imports of each commodities including of food and raw materials, fuels, and manufactures:

Table 6.1 shows the summary of data in the world economy model. In this model, consumption in primary products is effected by supply and demand trends in each country and world price movements. On the other hand, consumption in manufactures is largely determined by demand for imports and bilateral market shares. Shares of markets for manufactures in each region represent considerable stability resulting in significant short-term linkages between each region. In the longer run, changes in market shares have an important effect on the trade balance and growth of income in each region.

For income, population is an important criterion for assessing the level and rate of change of income and GDP and may influence demand for food and raw materials relative to income. Moreover, changes in world prices also have a significant impact on income of each bloc.

Table 6.1 Summary of data for the world economy model

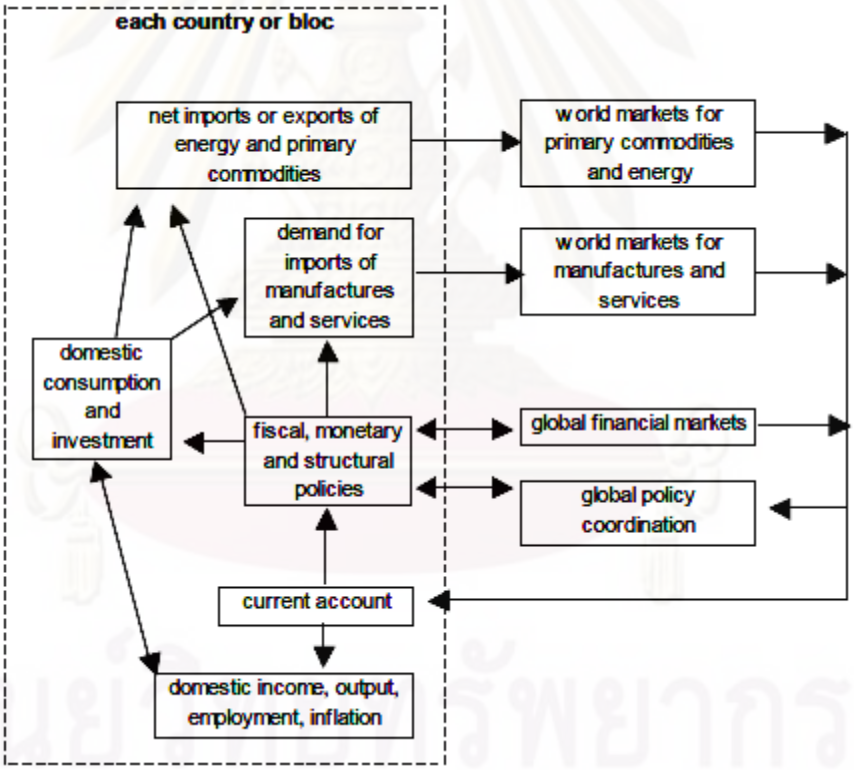
Topic / concept	Model variable(s)
Merchandise trade	Net exports of food and raw materials, net exports of energy and bilateral flows of trade in manufactures, current US$ deflated by a common global price index for trade in manufactures
Bilateral market shares for trade in manufactures	Share of each exporting bloc in imports of the same bloc (intra-trade) and other blocs (extra-trade)
Commodity terms of trade	Price of food and raw materials and energy relative to the price of manufactures (ratio)
GDP and national income	GDP (constant-price US$) with base-year PPP adjustment, national income defined as GDP adjusted for gain or loss attributable to changes in the commodity terms of trade
Domestic expenditure	Income (as defined above) minus trade balance
Energy supply and demand	Energy production with weighting to reflect the higher use value of primary electricity, net exports and energy demand (consumption plus change in stocks) measured in physical units (mtoe)
Population	Total population
Food and raw material supply and demand	A notional consumption figure is posulated based on population and national income. Production is inferred from consumption plus the trade balance adjusted for changes in the commodity terms of trade

6.3 Model Specification

Structure of the model

As shown in figure 6.1 below, in original CAM model, each country has same structural of equations including private sector, government sector, current account, and financial markets.

Figure 6.1 Original CAM Model framework



In private sector, private savings respond positively to disposable income and will reduce when the real exchange rate rise and will increase when more inflation pressure. For private investment and change in inventories, they respond positively to GDP growth. In government sector, the government's share of disposable income responds positively to growth of national income and negatively to private investment

spending and this share tends to rise with the value of energy exports and relative per capita income. For, government spending, it responds positively to growth of government income and the external current account surplus but is negatively affected by inflation pressure. The real value of government debt is eroded by inflation pressure and it has negative relation with the ratio of net government lending to debt.

In this model, short-term interest rates adjust positively to inflation and the level of capacity utilization. For bond rates, they adjust positively to short-term interest rates and inflation. The exchange reserves respond positively to the current account and negatively to imports growth and will be low when real exchange rate is high. Real exchange rates respond positively on trade balance and relative per capita income. For inflation, it responds positively to capacity utilization and the world oil price but responds negatively to the real exchange rate.

Trading goods are divided into three groups; primary goods, energy, and manufacture goods. For primary goods, changes in the volume of net exports of primary goods have a negative response to growth of GDP and population. Exports of primary goods are largely determined by the excess supply relative to domestic requirements and increase with GDP. The change in value of imports and exports respond positively to the world price and real exchange rate. In energy sector, energy demand increases with income per capita, relative income per capita, and price. Production of primary energy responds to domestic demand and price. The value of energy imports and exports depends on the world price of oil which adjusts to balance world supply and demand. For manufacture goods, changes in imports depend on final expenditure with exports and investment having a higher weight than consumers' expenditure and government expenditure. The value of imports also responds positively to the real exchange rate and to relative per capita income. Export market shares adjust positively to real exchange rates. In service markets, service income depends on the pattern of other commodities trade. Change in export and import are negatively depend on change in real exchange rate.

There are three main of linkages between economies of individual countries or country groups in CAM model: linkage in primary commodities and energy markets, linkage in manufactures and services markets, and linkage in financial markets. In primary commodities and energy markets and manufactures and services, supply in each country depends on domestic demand. Prices in world markets are depended on the gap between world demand and supply. And in long run, market shares of manufactures and services are response to relative costs of production in different country groups which is real effective exchange rates (ratio of domestic prices to world-average prices) in the model. In financial markets, exchange rates in each country are determined by global markets where prices respond to demands for exchange. In some cases exchange rates can be fixed or controlled by the monetary authority. Change in exchange rate will have a direct impact on profitability of exports and imports due to change in country's trade performance. The influence of global financial markets can also effect to interest rates, bond yields and stock prices.

A core model comprising identities and inexact equations is provided for analysis of historical trends and construction of scenarios. The modeling system allows users to examine results using different geographical disaggregations and to modify or extend the specification of variables and equations.

Equations in the CAM model comprise of behavioral equations and identity equations. Each country uses the same set of equations. The linkage among countries is identity in trade section. The Countries' GDP are calculated from demand side which equal to domestic expenditure plus balance in current account. Domestic expenditure is equal to non-government consumption plus domestic investment, and government expenditure.

Real domestic expenditure: $H = C + IP + IV + G$

National disposable income: $Y = (C + IP + IV + G) + CA$

There are 34 behavioral equations in this model. This part show estimated result of all equations and identity equations in the model. All behavioral equations in this model are estimated using panel regression technique with fixed effect model. Many series are non-stationary even when the data are normalised as ratios to income or GDP but the first differences of all variables are all stationary. Because of that, the first differences form are used when estimate equations.

Population:

$$dlog(N_t) = b_0 + b_1\, dlog(N_{t-1}) + u_t$$

Government income, expenditure and debt

Government disposable income:

$$d(YG_t)/Y_{t-1} = b_0 + b_1\, YG_{t-1}/Y_{t-1} + b_2\, XE_{t-1}/(rx_{t-1}\, Y_{t-1}) + b_3\, d(Y_t)/Y_{t-1} + b_4\, d(IP_t+IV_t)/Y_{t-1} + b_5\, log(1+YR_{t-1}) + u_t$$

Government expenditure on goods and services:

$$d(G_t)/Y_{t-1} = b_0 + b_1\, d(YG_t)/Y_{t-1} + b_2\, infp_t + b_3\, CA_{t-1}/(rx_{t-1} * Y_{t-1}) + u_t$$

Government net lending: $NLG_t = YG_t - G_t$

Government debt: $dlog(DG_t) = b_0 + b_1\, infp_t + b_2\, NLG_t/DG_t + u_t$

Non-government income and expenditure

Non-government disposable income: $YP_t = Y_t - YG_t$

Non-government savings (SP):

$$d(SP_t)/YP_{t-1} = b_0 + b_1\, SP_{t-1}/YP_{t-2} + b_2\, d(YP_t)/YP_{t-1} + b_3\, d(YP_{t-1})/YP_{t-2} + b_4\, d(YP_{t-2})/YP_{t-3} + b_5\, infp_t\, b_6\, dlog(rx_t) + u_t$$

Consumers expenditure (C): $C_t = YP_t - SP_t$

Non-government fixed investment:

$$IP_t/V_{t-1} = b_0 + b_1\, IP_{t-1}/V_{t-2} + b_2\, d(V_t)/V_{t-1} + b_3\, d(V_{t-1})/V_{t-2} + b_4\, d(V_{t-2})/V_{t-3} + u_t$$

Change in inventories:

$$IV_t/V_{t-1} = b_0 + b_1\, IV_{t-1}/V_{t-2} + b_2\, d(V_t)/V_{t-1} + u_t$$

Non-government net lending (NLP): $NLP_t = SP_t - IP_t - IV_t$

<u>Interest rates, reserves and the exchange rate</u>

Short-term interest rates:

$$dlog(is_t) = b_0 + b_1\, log(is_{t-1}) + b_2\, log(0.1+inf_{t-1}) + b_3\, dlog(0.1+inf_t) + b_4\, log(V_t/VT_t) + u_t$$

Bond rates:

$$dlog(im_t) = b_0 + b_1\, log(im_{t-1}) + b_2\, log(is_{t-1}) + b_3 dlog(is_t) + b_4\, log(0.1+inf_{t-1}) + b_5\, dlog(0.1+inf) + u_t$$

Real short rate irs = 100((1 + is/100)/(1 + pi/100) - 1)

Real bond rate irm = 100((1 + im/100)/(1 + pi/100) - 1)

Exchange reserves:

$$dlog((0.1+R_t)/M_t) = b_0 + b_1\, log((0.1+R_{t-1})/M_{t-1}) + b_2\, dlog(M_t) + b_3\, CA_t/M_{t-1} + b_4 log(rx_{t-1}) + u_t$$

Real exchange rate:

$$dlog(rx_t) = b_0 + b_1\, log(rx_{t-1}) + b_2\, ((X_{t-1}/M_{t-1}) - 1) + b_3\, log(1+YR_{t-1}) + u_t$$

Where $\sum (rx*H) = pp0w * \sum (H)$

<u>Capacity utilisation and inflation:</u>

Capacity: $CAPU_t = 1.05 * movav(V,6) * e^{(0.3*(\log(V/V_{t-6})))}$

Cost inflation:

$$dlog(0.05+inf_t) = b_0 + b_1\ log(0.05+inf_{t-1}) + b_2\ log(V_{t-1}/CAPU_{t-1}) + b_3\ dlog(rx_{t-1}) + b_4\ dlog(pew_t/rx_t) + u_t$$

In order to avoid the problem of large difference in inflation data, we convert it into inflationary pressure which its scale is between 0 to 1 with a value of 0 refer to zero inflation, 0.5 refer to inflation of 100%, and 1 refer to hyperinflation. The inflationary pressure is equal to:

Inflationary pressure: $infp_t = log(-0.718 + 3.436\ (1 + inf_t)/(2+inf_t))$

Terms of trade effect: $tt_t = (H_t + TB_t/rx_t)/(H_t + TB0_t/pp0_t)$

Price inflation: $pi_t = 100*(1 + inf_t)tt_{t-1}/(tt_t - 1)$

World dollar price index: $pw_t = pw_{t-1}\ (1 + pi\_us_t/100)\ x\ (rx\_us_{t-1}/rx\_us_t)$

World price inflation: $infw_t = 100*((pw_t/pw_{t-1}) - 1)$

Local dollar price index: $ph_t = pw_t * rx_t$

Nominal exchange appreciation /depreciation:

$$nrx_t = 100*((ph_t/ph_{t-1})/(1 + pi_t/100) - 1)$$

<u>The trade balance and the current account</u>

Trade balance (value): $TB_t = X_t - M_t$

Trade balance (volume): $B0_t = X0_t - M0_t$

Income and transfer debits:

$$dlog(1+MIT_t) = b_0 + b_1\ log(is\_us_t + is\_eur_t) + b_2\ dlog(X_t + M_t) + u_t$$

Net income and transfers from abroad:

$$d(BIT_t)/V_{t-1} = b_0 + b_1\ log(is\_eur_t + is\_us_t) *BIT_{t-1}/V_{t-1} + b_2\ CA_{t-1}/V_{t-1} + u_t$$

Income and transfer credits: $XIT_t = BIT_t + MIT_t$

$$\sum (XIT_t) = \sum (MIT_t)$$

Current account: $CA_t = TB_t + BIT_t$

Trade in goods and services

Exports of goods and services (value): $X_t = XA_t + XE_t + XM_t + XS_t$

Imports of goods and services (value): $M_t = MA_t + ME_t + MM_t + MS_t$

Exports of goods and services (volume): $X0_t = XA0_t + XE0_t + XM0_t + XS0_t$

Imports of goods and services (volume): $M0_t = MA0_t + ME0_t + MM0_t + MS0_t$

Trade in primary commodities

Net exports of primary commodities:

$$d(BA0_t)/V_{t-1} = b_0 + b_1\, d(V_t)/V_{t-1} + b_2\, d(N_t)/V_{t-1} + b_3\, d(lpa_t) + u_t$$

Exports of primary commodities (volume):

$$d(XA0_t)/V_t = b_0 + b_1\, d(BA0_t)/V_{t-1} + u_t$$

Imports of primary commodities (volume): $MA0_t = XA0_t - BA0_t$

$$\sum (XA0_t) = \sum (MA0_t)$$

Imports of primary commodities:

$$dlog(MA_t/MA0_t) = b_0 + b_1\, dlog(paw_t) + b_2\, dlog(rx_t) + u_t$$

Exports of primary commodities:

$$dlog(XA_t/XA0_t) = b_0 + b_1\, dlog(paw_t) + b_2\, dlog(rx_t) + u_t$$

$$\sum (XA_t) = \sum (MA_t)$$

World price of primary commodities:

$$dlog(paw_t) = b_0 + b_1\, log(paw_{t-1}) + b_2\, dlog(VW_t) + b_3\, dlog(XAW0_t) + b_4\, log(XAW0_{t-1}) + b_5\, log(NWt\text{-}1) + u_t$$

Local real price of primary commodities: $pal_t = 0.3\, pal_{t-1} + 0.7\, log(paw_t/rx_t)$

Trade in energy products

Imports of energy products (volume): $ME0_t = b_0 + b_1\, EM_t + u_t$

Exports of energy products (volume): $XE0_t = b_0 + b_1\, EX_t + u_t$

Imports of energy products (value, ME): $dlog(ME_t/ME0_t) = b_0 + b_1 \log(pew_t) + u_t$

Exports of energy products (value, XE): $dlog(XE_t/XE0_t) = b_0 + b_1 \log(pew_t) + u_t$

Trade in manufactures

Imports of manufactures (value):

$$dlog(MM_t) = b_0 + b_1 \log(MM_{t-1}/V_{t-1}) + b_2 \, dlog(C_t+0.4G_t +2.5(IP_t+IV_t)+3X_t) + b_3 \, dlog(rx_t) + b_4 \log(rx_{t-1}) + b_5 \log(1+YR_{t-1}) + u_t$$

Export market shares (value):

$$dlog(sxm_t) = b_0 + b_1 \log(sxm_{t-1}) + b_2 \, dlog(rx) + b_3 \log(rx_{t-1}) + b_4 \, dlog(FDI_{t-1}) + b_5 \, dlog(FDI_{t-2}) + u_t$$

$$\sum (sxm_i) = 1$$

Exports of manufactures (value): $XM_{i,t} = \sum(sxm_{i,j,t} * MM_{j,t})$

Exports of manufactures (volume):

$$dlog(XM0t/XMt) = b_0 + b_1 \log(XM0_{t-1}/XM_{t-1}) + b_2 \, dlog(rx_t) + b_3 \log(rx_t) + b_4 \log(1 + YR_{t-1}) + u_t$$

Manufactured imports supply price index: $pmm0_t = \sum (sxm_t * XM_t / XM0_t)$

Imports of manufactures (volume):

$$dlog(MM0_t/MM_t) = b_0 + b_1 \log(MM0_{t-1}/MM_{t-1}) + b_2 \, dlog(pmm0_t) + b_3 \log(pmm0_{t-1}) + b_4 \, dlog(rx) + u_t$$

$$\sum (MM0_t) = \sum (XM0_t)$$

Trade in services

Net exports of services (value):

$$d(BS_t)/V_{t-1} = b_0 + b_1 dlog(rx_t) + b_2 \, d(BA_t)/V_{t-1} + b_3 \, d(BE_t)/V_{t-1} + b_4 \, d(BM_t)/V_{t-1} + u_t$$

Imports of services (value):

$$d(MS_t)/V_t = b_0 + b_1 \, BS_t/V_t + b_2 \, dlog(rx_t) + b_3 \, d(MA_t)/V_{t-1} + b_3 \, d(XE_t)/V_t + b_5 \, d(MM_t)/V_t + u_t$$

Exports of services (value): $XS_t = BS_t + MS_t$

$$\sum (MS_t) = \sum (XS_t)$$

Imports of services (volume):

$$dlog(MS0_t/MS_t) = b_0 + b_1 \log(MS0_{t-1}/MS_{t-1}) + b_2\, dlog(rx_t) + u_t$$

Exports of services (volume):

$$dlog(XS0_t/XS_t) = b_0 + b_1 \log(XS0_{t-1}/XS_{t-1}) + b_2\, dlog(rx_t) + u_t$$

$$\sum (MS0_t) = \sum (XS0_t)$$

Physical energy supply and use (million tons of oil equivalent)

Primary energy absorption:

$$dlog(ED_t) = b_0 + b_1\, dlog(Y_t/N_t) + b_2\, d(lped_t) + b_3\, dlog(1+YR_{t-1}) + u_t$$

Primary energy production:

$$dlog(EP_t) = b_0 + b_1\, dlog(ED_t) + b_2\, ED_{t-1}/EP_{t-1} + b_3\, d(lpep_t) + u_t$$

Energy imports: $dlog(EM_t\text{-}max(ED\text{-}EP)_t) = b_0 + b_1\, dlog(ED_t) + u_t$

$$EX_t = EP_t + EM_t - ED_t$$

$$\sum (EP_t) = \sum (ED_t)$$

$$pew_t = pew_t * pw_t$$

Local user price of oil (lagged log value)

$$lped_t = 0.3 \log(pew_t /((6 - pew_t)rx_t)) + 0.7\, lped_{t-1}$$

Local producer price of oil (lagged log value)

$$lpep_t = 0.15 \log(pew_t /((6 - pew_t)rx_t)) + 0.85\, lpep_{t-1}$$

Summary of model structure

- the same structural forms are used for all blocs
- the same structural coefficients are applied for all blocs.
- consistency of historical data with postulated structural relationships is examined using normalized, de-trended series. If an equation is affected by

structural changes, a trend term is estimated for the historical period and continuation of the same trend is taken as a starting point for consideration of future changes. In most cases the most recent residual is retained in projections.

- there is no attempt to fit erratic patterns by adjust the structural forms. In some cases it must be accepted that the model does not capture features which have a significant quantitative impact even when trends are incorporated.

In this model, to study the impact of FDI to macro economy, we modify original equation of export share by adding FDI variable into the equation base on the hypothesis that FDI will create more export of manufacture goods because it increase technology of production and increase more competitiveness in the world markets. Therefore, the equation of export share will be in this form:

$$dln(sxm_{it}) = b_0 + b_1\, ln(sxm_{it-1}) + b_2\, dln(rx_{it}) + b_3\, ln(rx_{it-1}) + b_4\, dln(FDI_{it}) + b_5\, dln(FDI_{it-1}) + u_t$$

New framework of the model is showed in figure 6.2. FDI will affect export and import of manufacture goods. This will affect current account of host country by increase current account surplus and then in change in host countries' fiscal and monetary policy variables, for example, real exchange rate and interest rate. Change in policy variables then affect to domestic expenditure and country's income.

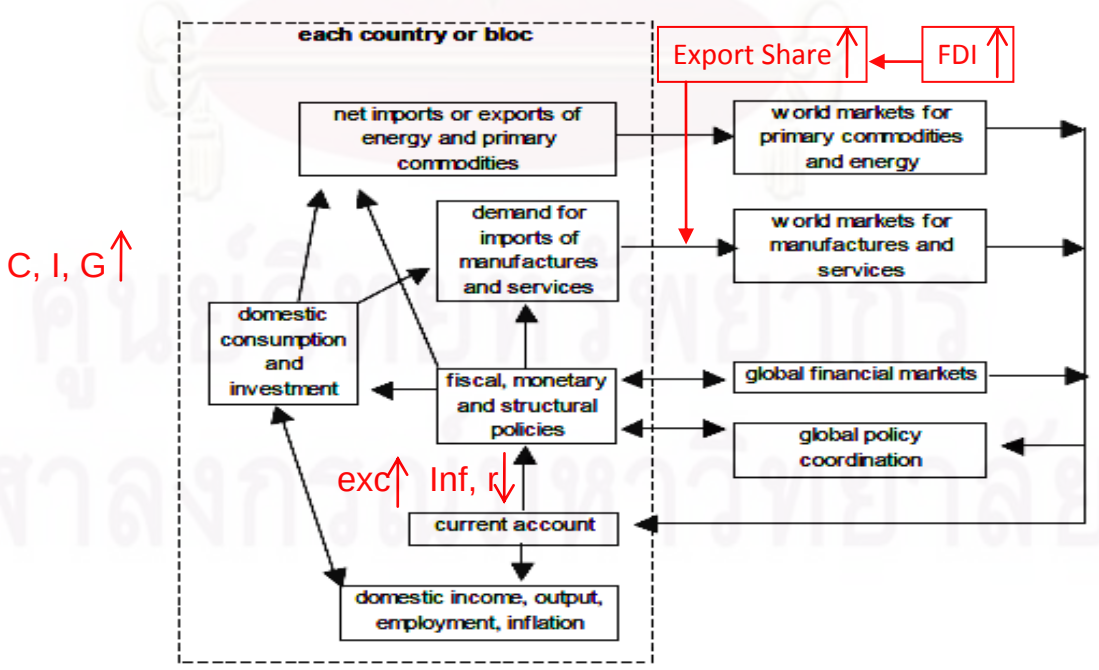
In this paper, we group all 127 countries in the model into 16 country groups by their economic structure (USA, Europe, Japan, Other Developed countries[14], CIS and Other countries, West Asia, East Asia High Income, East Asia Middle Income, India, South Asia, East Asia Low Income, Central America, South America, Africa Middle

[14] Canada, Australia, New Zealand, Israel

Income, and Africa Low Income countries) because the assumption that impacts of FDI is different in countries which have difference in economic conditions, as we discuss in chapter 3. We focus mainly on impacts of FDI in high income in East Asia countries, middle income countries in East Asia, and low income countries in East Asia.

In simulation process, to find the impact of FDI on other economic variables, firstly, we generate FDI data in the future period by using time series model with second order autoregressive form to construct the baseline scenario. Secondly, in the first scenario, we increase FDI in host country 5% from the baseline data and we make our simulation process to period 2020. And in the second scenario, despite of changing the value of FDI, we try to simulate the result by changing export share of manufacture goods in host countries directly. In this study we assume that export share will increase 5% in high income countries, 3% in middle income countries, and 1% in low income countries because countries which have higher income are generally have larger proportion in export markets share and they can also absorb technology from technology transfer process better than lower income countries.

Figure 6.2 Modified CAM model framework



6.4 Empirical results of the relation between FDI and macro economy using CAM model

Firstly, because our data is time series data, we have to test for the stationary of all variables in the model. Variables in the CAM model can be classified into four main groups: (1) domestic output, income and expenditure, (2) monetary system and inflation, (3) trade & current account, and (4) Physical energy group.

In this model, in order to minimize heteroscedasticity problem in many equations, the GDP is used to normalise the magnitude of the dependent variable through time and across countries. By the way, lagged of GDP is used rather than current-year GDP to avoid problems that may occur when running simulation process. Table 6.2 shows the list and integration order of all variables in the model. Integration order 0 indicates that variable is already stationary at level form and integration order 1 indicates that variable is stationary at first difference form.

Table 6.2 CAM Model variables and their Integration order

Variable		Integration order
1. Domestic output, income and expenditure		
1.1 GDP, national income and population		
H	Domestic expenditure	1
V	GDP at constant prices	1
Y	National disposable income	1
N	Population (millions)	1
YR	Relative per capita income	1
1.1 Government		
YG	Government disposable income	0
G	Government expenditure on goods and services	1
NLG	Government net lending	1
DG	Government debt	1
1.2 Non-government		
YP	Non-government disposable income	0
SP	Non-government saving	1
C	Consumers expenditure	1
IP	Non-government fixed investment	1
IV	Change in inventories	0
LP	Non-government net lending	0

Table 6.2 CAM Model variables and their Integration order (Cont.)

Variable		Integration order
2. Monetary system and inflation		
2.1 Monetary system		
is	Short interest rate (% pa)	1
im	Bond rate (% pa)	1
irs	Real short interest rate (% pa)	0
irm	Real bond rate (% pa)	0
R	Exchange reserves	1
rx	Real exchange rate (index)	1
2.2 Inflation		
vt	Capacity	0
inf	Cost inflation (% pa)	0
infp	Inflationary pressure	0
tt	Term of trade effect	1
pi	Price inflation (% pa)	0
rxna	Nominal exchange appreciation/depreciation (% pa)	0
ph	Dollar price of domestic expenditure (index)	1
3. Trade & current account		
3.1 Current account		
TB	Trade balance	0
IT	Income and transfer debits	0
BIT	Net income and transfer from abroad	0
IT	Income and transfer credits	0
CA	Current account	0
X	Exports of goods and services (value)	1
M	Imports of goods and services (value)	1
X0	Exports of goods and services (volume)	1
M0	Imports of goods and services (volume)	1
3.2 Primary commodities		
XA0	Exports of primary commodities (volume)	0
MA0	Import of primary commodities (volume)	1
MA	Imports of primary commodities (value)	1
XA	Exports of primary commodities (value)	1
lpa	Local real price of primary commodities	1

Table 6.2 CAM Model variables and their Integration order (Cont.)

Variable		Integration order
3.3 Energy products		
ME0	Imports of energy products (volume)	1
XE0	Exports of energy products (volume)	0
ME	Import of energy products (value)	1
XE	Exports of energy products (value)	1
3.4 Manufactures		
MM	Imports of manufactures (value)	1
XM	Exports of manufactures (value)	1
XM0	Exports of manufactures (volume)	0
MM0	Imports of manufactures (volume)	1
sxm	Export market shares (%)	0
3.5 Services		
MS	Imports of services (value)	1
XS	Exports of services (value)	1
MS0	Imports of services (volume)	1
XS0	Exports of services (volume)	1
4. Physical energy (million tons oil equivalent)		
ED	Primary energy absorption	1
EP	Primary energy production	1
EM	Energy imports	1
EX	Energy exports	1
lped	Local user price of oil	1
lped	Local producer of oil	1

Table 6.2 shows that most variables in the model are non-stationary at the level form but stationary at first difference form. Therefore, we have to estimate all equations in the model by using cointegration analysis

Next part, we show the estimated results of each equation in this model. The first equation is population function which population in each country increases over time.

$$dlog(N_t) = \beta_{0i} + 0.98\ dlog(N_{t-1}) + u_t \quad (6.1)$$

In government sector, for government spending, it responds positively to growth of government income and the external current account surplus but is negatively affected by inflation pressure.

$$d(YG_t)/Y_{t-1} = \beta_{0i} - 0.21YG_{t-1}/Y_{t-1} + 0.10XE_{t-1}/(rx_{t-1}\ Y_{t-1}) + 0.35d(Y_t)/Y_{t-1} - 0.08d(IP_t+IV_t)/Y_{t-1} + 0.02\ log(1+YR_{t-1}) + u_t \quad (6.2)$$

$$d(G_t)/Y_{t-1} = \beta_{0i} + 0.18d(YG_t)/Y_{t-1} - 0.01infp_t + 0.04CA_{t-1}/(rx_{t-1}* Y_{t-1}) + u_t \quad (6.3)$$

The real value of government debt is eroded by inflation pressure and has negative relation with the ratio of net government lending to debt.

$$dlog(DG_t) = \beta_{0i} - 0.05infp_t - 0.31NLG_t/DG_t + u_t \quad (6.4)$$

In private sector, private savings respond positively to disposable income and inflation pressure but have negative relationship with the real exchange. For, private investment and change in inventories, they respond positively to GDP growth.

$$d(SP_t)/YP_{t-1} = \beta_{0i} + 0.63SP_{t-1}/YP_{t-2} + 0.71d(YP_t)/YP_{t-1} - 0.18d(YP_{t-1})/YP_{t-2} - 0.01d(YP_{t-2})/YP_{t-3} + 0.06infp_t - 0.04dlog(rx_t) + u_t \quad (6.5)$$

Private fixed investment:

$$IP_t/V_{t-1} = \beta_{0i} + 0.83\ IP_{t-1}/V_{t-2} + 0.41d(V_t)/V_{t-1} - 0.05d(V_{t-1})/V_{t-2} - 0.01\ d(V_{t-2})/V_{t-3} + u_t \quad (6.6)$$

Change in inventories:

$$IV_t/V_{t-1} = \beta_{0i} + 0.17\ IV_{t-1}/V_{t-2} + 0.20d(V_t)/V_{t-1} + u_t \quad (6.7)$$

In this model, short-term interest rates and bond rates adjust positively to inflation. And short-term interest rates also have a positive relationship with the level of capacity utilization.

Short-term interest rates:

$$dlog(is_t) = \beta_{0i} - 0.28\ log(is_{t-1}) + 0.17log(0.1+inf_{t-1}) + 0.34dlog(0.1+inf_t) + 1.46\ log(V_t/VT_t) + u_t \quad (6.8)$$

Bond rates:

$$dlog(im_t) = \beta_{0i} - 0.28log(im_{t-1}) + 0.09\ log(is_{t-1}) + 0.14dlog(is_t) + 0.20\ log(0.1+inf_{t-1}) + 0.80\ dlog(0.1+inf) + u_t \quad (6.9)$$

The exchange reserves respond positively to the current account and negatively to imports growth and real exchange rate. For real exchange rates, they respond positively on trade balance and relative per capita income.

Exchange reserves:

$$dlog((0.1+R_t)/M_t) = \beta_{0i} - 0.08\ log((0.1+R_{t-1})/M_{t-1}) - 0.80dlog(M_t) + 0.53CA_t/M_{t-1} - 0.14\ log(rx_{t-1}) + u_t \quad (6.10)$$

Real exchange rates:

$$dlog(rx_t) = \beta_{0i} - 0.28log(rx_{t-1}) + 0.10\ ((X_{t-1}/M_{t-1}) - 1) + 0.30\ log(1+YR_{t-1}) + u_t \quad (6.11)$$

For inflation, it responds positively to capacity utilization and the world oil price but responds negatively to the real exchange rate.

$$dlog(0.05+inf_t) = \beta_{0i} - 0.47\ log(0.05+inf_{t-1}) + 0.44\ log(V_{t-1}/CAPU_{t-1}) - 0.33\ dlog(rx_{t-1}) + 0.22\ dlog(pew_t/rx_t) + u_t \quad (6.12)$$

Income and transfer debits in each country are positively related to short term interest rates for the main trading currencies and to the value of trade. The net flow of income and transfer are positively response to net financial flows and short term interest rates for the main trading currencies.

Income and transfer debits:

$$\text{dlog}(1+\text{MIT}_t) = \beta_{0i} + 0.11\ \log(\text{is\_us}_t + \text{is\_eur}_t) + 0.62\ \text{dlog}(X_t + M_t) + u_t \quad (6.13)$$

Net income and transfers from abroad:

$$d(\text{BIT}_t)/V_{t-1} = \beta_{0i} + 0.12\ \log(\text{is\_eur}_t + \text{is\_us}_t) * \text{BIT}_{t-1}/V_{t-1} + 0.01\ CA_{t-1}/V_{t-1} + u_t \quad (6.14)$$

In trade sector, for primary goods, changes in the volume of net exports of primary goods have a negative response to growth of GDP and population. Exports of primary goods are largely determined by the excess supply relative to domestic requirements and increase with GDP.

Net exports of primary commodities:

$$d(\text{BA0}_t)/V_{t-1} = \beta_{0i} - 0.01\ d(V_t)/V_{t-1} - 9.29\ d(N_t)/V_{t-1} + 0.01\ d(\text{lpa}_t) + u_t \quad (6.15)$$

Exports of primary commodities:

$$d(\text{XA0}_t)/V_t = \beta_{0i} + 0.91\ d(\text{BA0}_t)/V_{t-1} + u_t \quad (6.16)$$

For exports and imports value of primary commodities, the change in value of imports and exports respond positively to the world price and real exchange rate.

Value of imports of primary commodities:

$$\text{dlog}(\text{MA}_t/\text{MA0}_t) = \beta_{0i} + 0.88\ \text{dlog}(\text{paw}_t) + 0.47\ \text{dlog}(\text{rx}_t) + u_t \quad (6.17)$$

Value of exports of primary commodities:

$$\text{dlog}(\text{XA}_t/\text{XA0}_t) = \beta_{0i} + 0.97\ \text{dlog}(\text{paw}_t) + 0.55\ \text{dlog}(\text{rx}_t) + u_t \quad (6.18)$$

World price of primary commodities:

$$dlog(paw_t) = \beta_{0i} - 0.27\ log(paw_{t-1}) + 0.31 dlog(VW_t) + 0.25 dlog(XAW0_t) + 0.10\ log(XAW0_{t-1}) + 0.45\ log(NWt\text{-}1) + u_t \quad (6.19)$$

In energy sector, energy demand increases with income per capita, relative income per capita, but have a negative relationship with its price. Production of primary energy responds positively to domestic demand and price.

Primary energy demand:

$$dlog(ED_t) = \beta_{0i} + 0.28\ dlog(Y_t/N_t) - 0.05\ d(lped_t) + 0.18\ dlog(1+YR_{t-1}) + u_t \quad (6.20)$$

Primary energy production:

$$dlog(EP_t) = \beta_{0i} + 0.97\ dlog(ED_t) + 0.90\ ED_{t-1}/EP_{t-1} + 0.02\ d(lpep_t) + u_t \quad (6.21)$$

Energy imports: $dlog(EM_t) = \beta_{0i} + 0.46\ dlog(ED_t) + u_t$ (6.22)

The value of imports and exports of energy product depends on the world price of oil which adjusts to balance world supply and demand.

Imports of energy products:

$$ME0_t = \beta_{0i} + 142.98\ EM_t + u_t \quad (6.23)$$

Exports of energy products:

$$XE0_t = \beta_{0i} + 125.58\ EX_t + u_t \quad (6.24)$$

Value of Imports of energy products:

$$dlog(ME_t/ME0_t) = \beta_{0i} + 0.99\ log(pew_t) + u_t \quad (6.25)$$

Value of exports of energy products:

$$dlog(XE_t/XE0_t) = \beta_{0i} + 1.07\ log(pew_t) + u_t \quad (6.26)$$

For manufacture goods, changes in imports value depend on final expenditure with exports and investment having a higher weight than consumers' expenditure and government expenditure and also respond positively to the real exchange rate and to relative per capita income.

Value of Imports of manufactures:

$$dlog(MM_t) = \beta_{0i} - 0.10\ log(MM_{t-1}/V_{t-1}) + 1.52dlog(C_t+0.4G_t+2.5(IP_t+IV_t)+3X_t) + 0.39\ dlog(rx_t) + 0.14\ log(rx_{t-1}) + 0.06\ log(1+YR_{t-1}) + u_t \quad (6.27)$$

Value of imports of manufactures:

$$dlog(MM0_t/MM_t) = \beta_{0i} - 0.18\ log(MM0_{t-1}/MM_{t-1}) - 0.63\ dlog(pmm0_t) - 0.22log(pmm0_{t-1}) - 0.35\ dlog(rx) + u_t \quad (6.28)$$

For export, export market shares of manufactures adjust negatively to real exchange rates but positively to FDI.

$$dlog(sxm_t) = \beta_{0i} - 0.07\ log(sxm_{t-1}) - 0.22\ dlog(rx) - 0.05\ log(rx_{t-1}) + 0.01\ dlog(FDI_t) + 0.04\ dlog(FDI_{t-1}) + u_t \quad (6.29)$$

And exports of manufactures from host country to their trade partner is equal to summation of export share multiply by total import from their trade partner: $XM_{i,t} = \sum(sxm_{i,j,t} * MM_{j,t})$. From the result of this equation, we can conclude that FDI will stimulate export of manufacture goods by increase manufacture export share.

Value of exports of manufactures:

$$dlog(XM0t/XMt) = \beta_{0i} - 0.08\ log(XM0_{t-1}/XM_{t-1}) - 0.59\ dlog(rx_t) - 0.04\ log(rx_t) + 0.13log(1 + YR_{t-1}) + u_t \quad (6.30)$$

In service markets, service income depends on the pattern of other commodities trade. Change in export and import are negatively depend on change in real exchange rate.

Value of net exports of services:

$$d(BS_t)/V_{t-1} = \beta_{0i} - 0.01 d\log(rx_t) + 0.01\, d(BA_t)/V_{t-1} - 0.03\, d(BE_t)/V_{t-1} + 0.06\, d(BM_t)/V_{t-1} + u_t \quad (6.31)$$

Value of imports of services:

$$d(MS_t)/V_t = \beta_{0i} + 0.54\, BS_t/V_t + 0.01\, d\log(rx_t) - 0.27\, d(MA_t)/V_{t-1} + 0.03\, d(XE_t)/V_t + 0.11\, d(MM_t)/V_t + u_t \quad (6.32)$$

Imports of services (volume):

$$d\log(MS0_t/MS_t) = \beta_{0i} - 0.9 \log(MS0_{t-1}/MS_{t-1}) - 0.37\, d\log(rx_t) + u_t \quad (6.33)$$

Exports of services (volume):

$$d\log(XS0_t/XS_t) = \beta_{0i} - 0.87 \log(XS0_{t-1}/XS_{t-1}) - 0.55\, d\log(rx_t) + u_t \quad (6.34)$$

After finish in estimating all equations, we now go to the simulation process. In simulation process, we begin with comparing the actual value and simulated value in historical simulation period during 1980-2005 to find that our model is good enough for forecast in the future period or not. Figure 6.3-6.9 show the actual value and predicted value for private investment, interest rare, inflation, real exchange rate, import of manufacture goods, export share, and government expenditure. From the figures, we conclude that the model is good in forecasting private investment, interest rare, import of manufacture goods, and government expenditure but not good in forecasting inflation, real exchange rate, and export share because it cannot capture the effects in short run period. However, the model is good enough to forecast in long-term period because it can capture long term trend for all variables.

Figure 6.3: Actual and simulated value of Private investment function

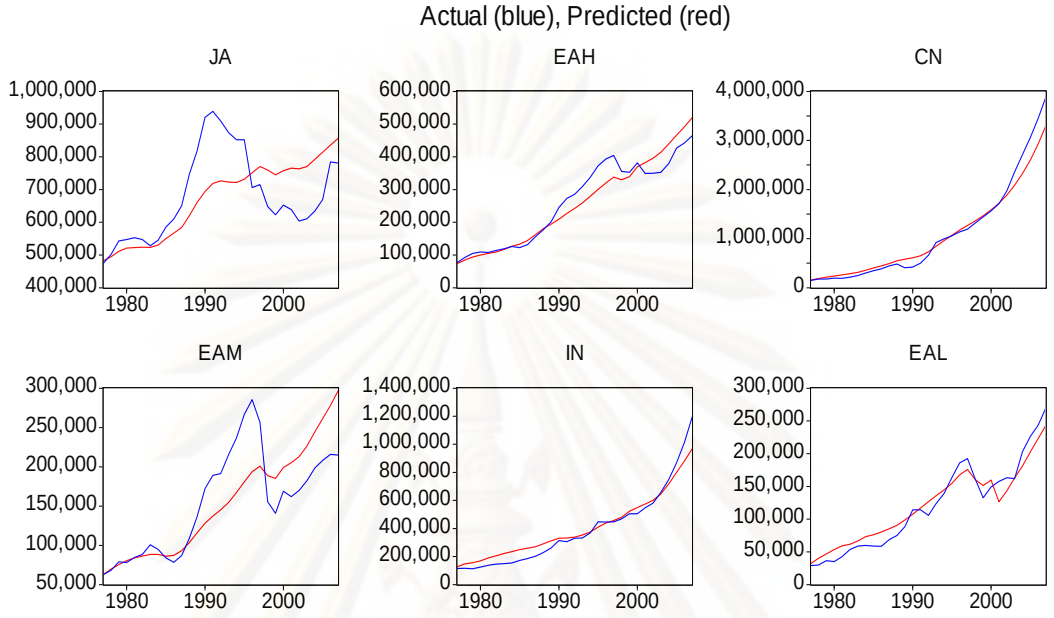


Figure 6.4 Actual and simulated value of Interest rate function

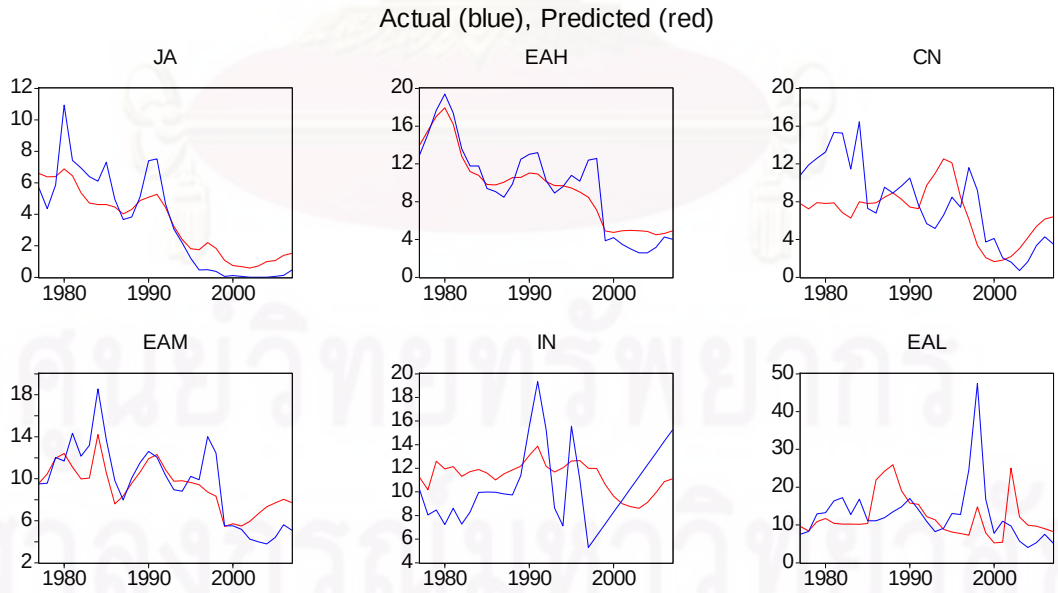


Figure 6.5 Actual and simulated value of cost inflation function

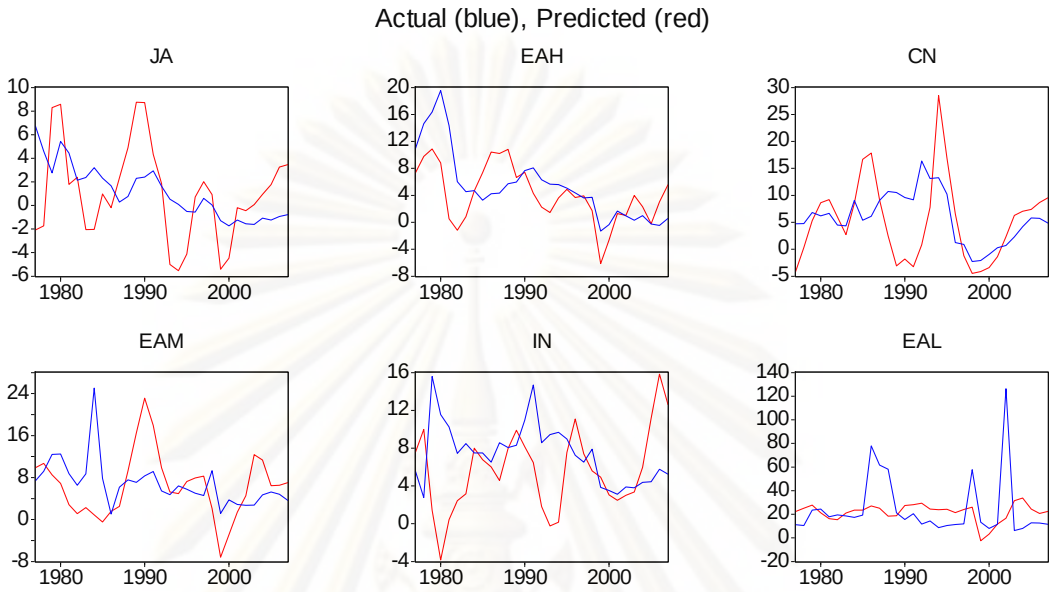


Figure 6.6 Actual and simulated value of exchange rate function

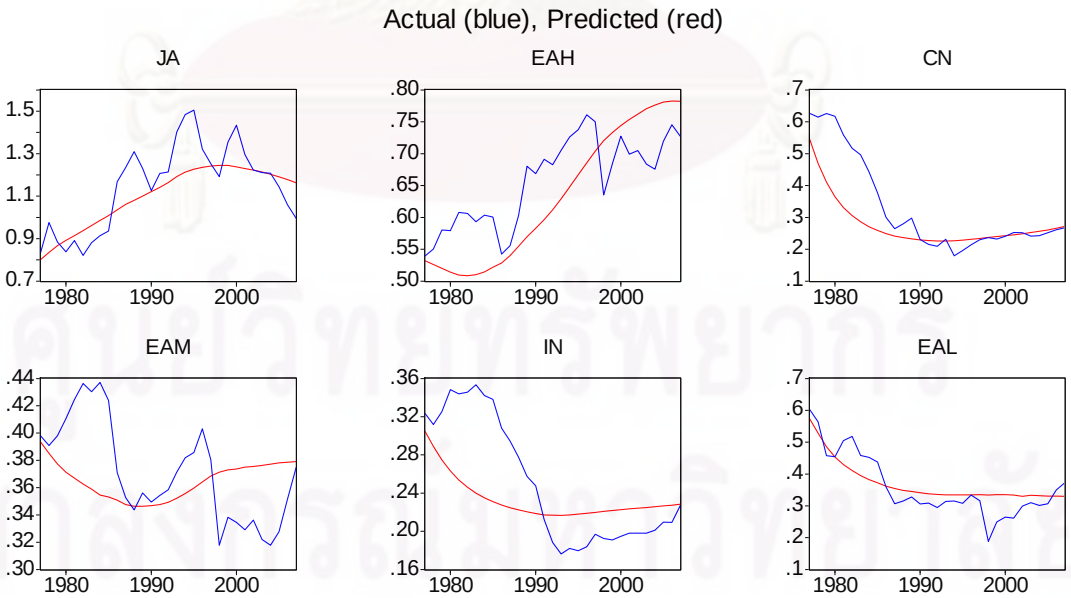


Figure 6.7 Actual and simulated value of import function

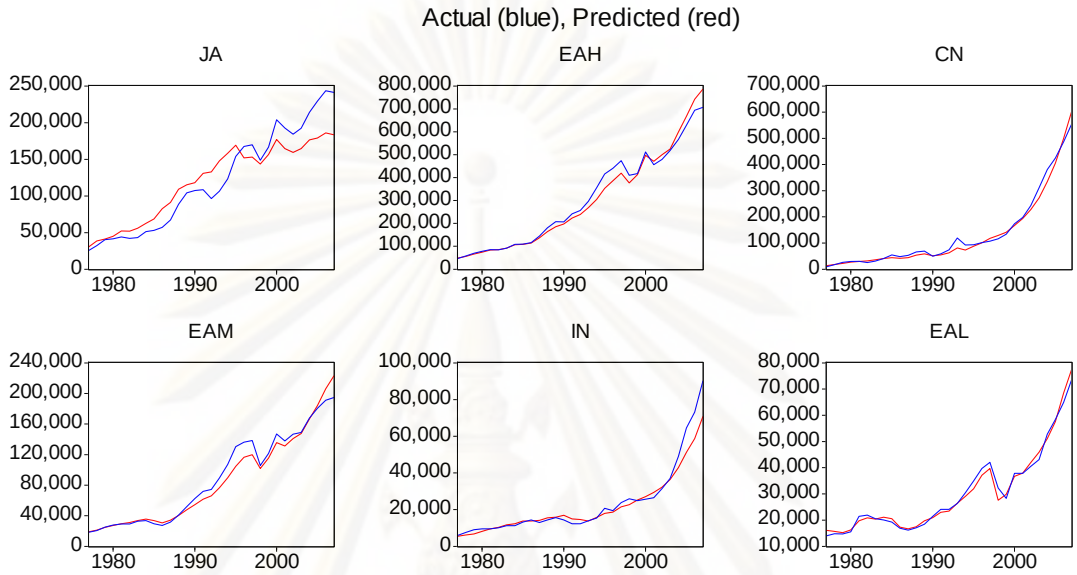


Figure 6.8 Actual and simulated value of government spending function

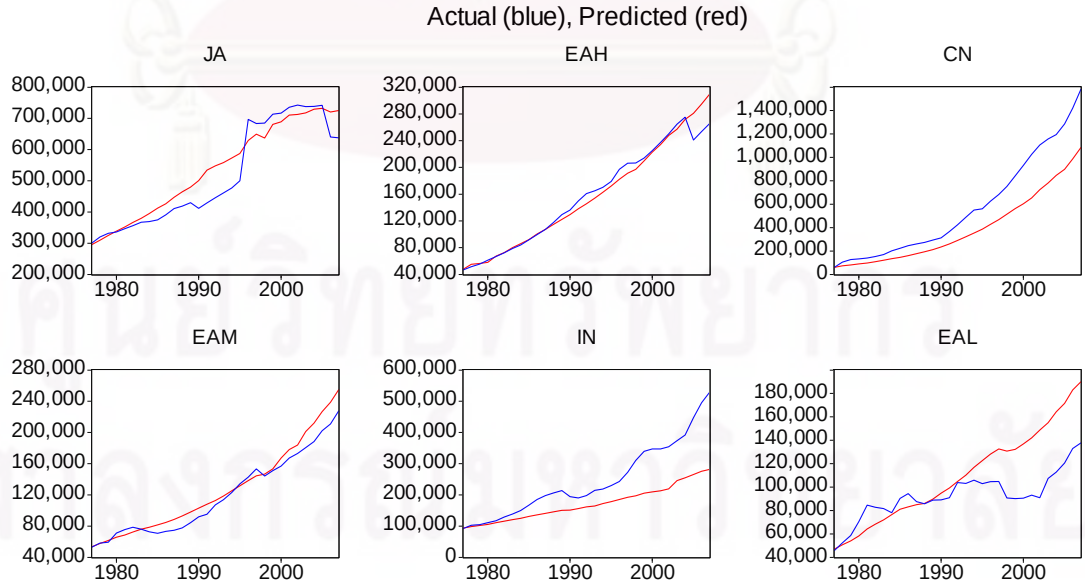
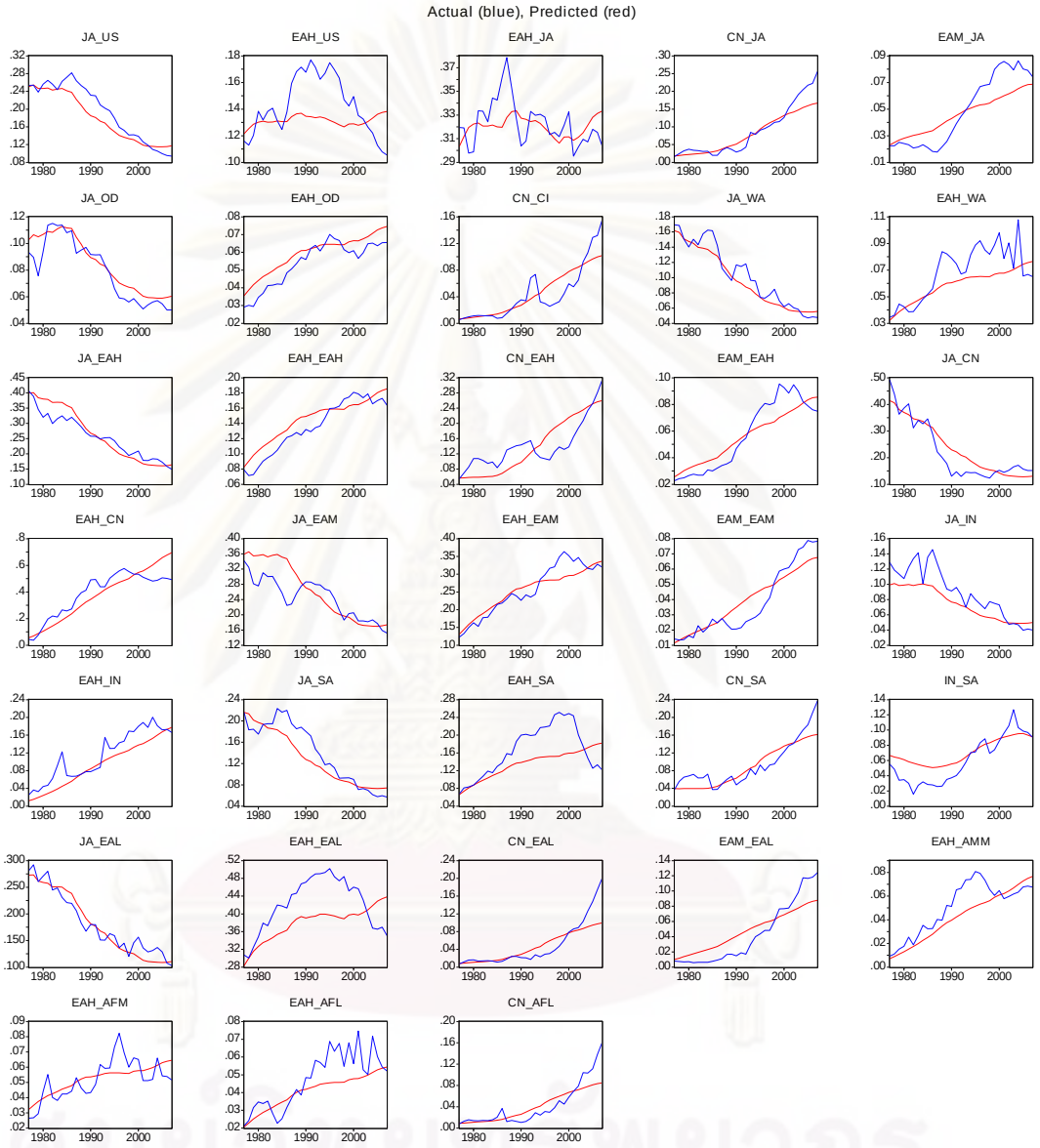


Figure 6.9 Actual and simulated value of export share function



Simulation scenario

To study the impact of FDI, firstly, we construct the baseline scenario by generate FDI data in the future period by using time series model with second order autoregressive form.

- In the first scenario, we increase FDI in host country 5% from the baseline data and we make our simulation process until period 2020. In this model, we expected that increasing FDI will increase exports and reduce deficit in trade balance. The exchange rate will appreciate due to the increasing in demand of host countries manufacture goods. The appreciation of host currency will decrease inflation and also decrease an interest rate. These process leads to increase in host countries domestic consumption and investment, and finally increase in their GDP.

- In the second scenario, despite of changing the value of FDI, we try to simulate the result by changing export share of manufacture goods in host countries directly. In this study we assume that export share will increase 5% in high income countries, 3% in middle income countries, and 1% in low income countries because countries which have higher income are generally have larger proportion in export markets share and they can also absorb technology from technology transfer process better than lower income countries.

Table 6.3 Simulation Results: high income countries

	2010	2011	2012	2013-2015	2016-2020
Exports of manufactures as ($US bn)					
Baseline	980.6	1109.9	1230.1	1410.7	1649.4
Scenario 1	980.9	1111.1	1231.4	1412.8	1651.5
Scenario 2	989.0	1129.1	1261.3	1468.1	1751.7
Imports of manufactures ($US bn)					
Baseline	761.9	852.6	936.4	1061.5	1229.9
Scenario 1	762.1	853.4	937.3	1063.0	1231.6
Scenario 2	767.7	865.9	958.2	1101.7	1302.8
Trade balance as ($US bn)					
Baseline	47.9	68.7	97.5	140.7	180.7
Scenario 1	48.0	69.0	97.8	141.2	180.9
Scenario 2	49.8	73.1	104.8	153.9	201.5
Real exchange rate					
Baseline	0.6	0.6	0.7	0.7	0.8
Scenario 1	0.6	0.6	0.7	0.7	0.8
Scenario 2	0.6	0.6	0.7	0.7	0.8
Cost inflation					
Baseline	-7.4	-2.2	5.0	9.0	-1.8
Scenario 1	-7.4	-2.2	5.1	9.1	-1.9
Scenario 2	-7.2	-1.4	6.4	10.1	-1.8
Bond rate					
Baseline	-1.0	2.4	8.0	12.8	3.9
Scenario 1	-1.0	2.5	8.0	12.8	3.8
Scenario 2	-0.8	3.1	9.1	13.9	4.0

Table 6.3 Simulation Results: high income countries (Cont)

	2010	2011	2012	2013-2015	2016-2020
Private investment ($US bn)					
Baseline	475.3	531.4	592.8	687.6	816.7
Scenario 1	475.4	531.8	593.3	688.3	817.2
Scenario 2	478.0	538.6	604.8	707.3	845.9
Private Consumption ($US bn)					
Baseline	1095.5	1161.4	1237.3	1393.7	1724.5
Scenario 1	1095.6	1161.8	1237.7	1394.4	1725.4
Scenario 2	1097.8	1167.4	1247.3	1413.7	1766.7
Government expenditure ($US bn)					
Baseline	304.1	320.6	336.7	368.2	444.5
Scenario 1	304.1	320.6	336.7	368.3	444.6
Scenario 2	304.4	321.3	337.8	370.2	450.5
Growth rates of GDP (%)					
Baseline	6.8	9.2	8.1	5.6	4.0
Scenario 1	6.8	9.2	8.1	5.6	4.0
Scenario 2	7.4	9.8	8.6	5.9	4.2

Table 6.4 Simulation Results: middle income countries

	2010	2011	2012	2013-2015	2016-2020
Exports of manufactures as ($US bn)					
Baseline	257.5	268.8	284.4	317.7	371.4
Scenario 1	257.6	269.2	284.8	318.3	371.9
Scenario 2	257.3	268.2	283.3	315.6	366.8
Imports of manufactures ($US bn)					
Baseline	240.6	254.4	269.9	300.2	344.1
Scenario 1	240.7	254.7	270.2	300.6	344.4
Scenario 2	240.5	254.0	269.2	298.4	339.4
Trade balance as ($US bn)					
Baseline	13.6	10.7	11.2	14.8	25.0
Scenario 1	13.6	10.8	11.3	15.0	25.1
Scenario 2	13.5	10.5	11.0	14.7	25.3
Real exchange rate					
Baseline	0.4	0.4	0.4	0.4	0.4
Scenario 1	0.4	0.4	0.4	0.4	0.4
Scenario 2	0.4	0.4	0.4	0.4	0.4
Cost inflation					
Baseline	-0.1	-0.2	1.2	6.9	5.3
Scenario 1	-0.1	-0.2	1.2	6.9	5.3
Scenario 2	-0.1	-0.3	1.1	6.9	5.4
Bond rate					
Baseline	3.7	3.2	4.1	8.8	8.6
Scenario 1	3.7	3.3	4.2	8.8	8.6
Scenario 2	3.6	3.2	4.1	8.8	8.7

Table 6.4 Simulation Results: middle income countries (Cont)

	2010	2011	2012	2013-2015	2016-2020
Private investment ($US bn)					
Baseline	285.6	299.5	318.8	367.9	458.4
Scenario 1	285.6	299.8	319.2	368.4	458.9
Scenario 2	285.5	299.2	318.4	367.5	458.6
Private Consumption ($US bn)					
Baseline	816.7	840.1	868.8	938.7	1111.5
Scenario 1	816.7	840.3	869.2	939.3	1112.5
Scenario 2	816.6	839.8	868.4	938.2	1111.6
Government expenditure ($US bn)					
Baseline	263.2	274.7	286.9	311.5	364.5
Scenario 1	263.2	274.7	287.0	311.6	364.7
Scenario 2	263.2	274.6	286.9	311.4	364.4
Growth rates of GDP (%)					
Baseline	2.5	3.5	4.6	5.0	4.7
Scenario 1	2.6	3.5	4.7	5.0	4.7
Scenario 2	2.5	3.4	4.6	5.0	4.7

Table 6.5 Simulation Results: China

	2010	2011	2012	2013-2015	2016-2020
Exports of manufactures as ($US bn)					
Baseline	1300.6	1455.9	1574.0	1753.1	1958.9
Scenario 1	1301.0	1457.5	1575.6	1755.4	1960.9
Scenario 2	1311.1	1477.9	1607.4	1807.9	2042.1
Imports of manufactures ($US bn)					
Baseline	890.8	1014.9	1124.6	1321.1	1632.0
Scenario 1	891.0	1015.7	1125.3	1322.3	1633.1
Scenario 2	895.5	1025.0	1140.1	1347.7	1675.5
Trade balance as ($US bn)					
Baseline	286.8	301.1	301.3	267.5	119.2
Scenario 1	287.0	301.9	302.2	268.7	120.0
Scenario 2	292.4	313.1	319.3	295.9	158.0
Real exchange rate					
Baseline	0.3	0.3	0.4	0.4	0.4
Scenario 1	0.3	0.3	0.4	0.4	0.4
Scenario 2	0.3	0.3	0.4	0.4	0.4
Cost inflation					
Baseline	-4.2	-6.1	-5.7	-3.9	-4.4
Scenario 1	-4.2	-6.0	-5.6	-3.9	-4.4
Scenario 2	-4.0	-5.7	-5.2	-3.5	-4.3
Bond rate					
Baseline	2.2	-0.1	-0.5	0.4	-0.2
Scenario 1	2.2	-0.1	-0.5	0.4	-0.2
Scenario 2	2.3	0.2	-0.1	0.8	-0.1

Table 6.5 Simulation Results: China (Cont)

	2010	2011	2012	2013-2015	2016-2020
Private investment ($US bn)					
Baseline	4621.4	4842.0	5090.1	5581.5	6602.8
Scenario 1	4621.8	4843.7	5092.3	5584.6	6606.5
Scenario 2	4631.8	4868.6	5132.1	5653.4	6733.5
Private Consumption ($US bn)					
Baseline	4957.3	5482.7	5946.2	6912.1	8875.3
Scenario 1	4957.7	5484.0	5947.1	6914.3	8879.5
Scenario 2	4967.3	5498.8	5970.6	6963.0	9002.4
Government expenditure ($US bn)					
Baseline	2131.6	2326.2	2518.1	2910.7	3707.5
Scenario 1	2131.6	2326.5	2518.4	2911.5	3709.2
Scenario 2	2133.5	2330.2	2524.9	2927.1	3755.1
Growth rates of GDP (%)					
Baseline	5.5	7.8	6.1	5.3	4.3
Scenario 1	5.5	7.8	6.1	5.3	4.3
Scenario 2	5.8	8.1	6.3	5.5	4.5

Table 6.6 Simulation Results: low income countries

	2010	2011	2012	2013-2015	2016-2020
Exports of manufactures as ($US bn)					
Baseline	64.0	66.1	68.8	72.8	79.2
Scenario 1	64.0	66.2	68.9	72.9	79.3
Scenario 2	64.0	66.1	68.8	72.8	79.2
Imports of manufactures ($US bn)					
Baseline	82.9	86.1	89.1	94.0	101.1
Scenario 1	83.0	86.1	89.2	94.1	101.2
Scenario 2	82.9	86.1	89.2	94.0	101.1
Trade balance as ($US bn)					
Baseline	-0.2	5.4	9.2	14.1	22.5
Scenario 1	-0.2	5.5	9.2	14.2	22.6
Scenario 2	-0.2	5.5	9.2	14.1	22.5
Real exchange rate					
Baseline	0.4	0.4	0.4	0.4	0.4
Scenario 1	0.4	0.4	0.4	0.4	0.4
Scenario 2	0.4	0.4	0.4	0.4	0.4
Cost inflation					
Baseline	10.9	10.7	13.1	20.4	20.5
Scenario 1	10.9	10.8	13.1	20.4	20.5
Scenario 2	10.9	10.7	13.1	20.4	20.5
Bond rate					
Baseline	18.7	18.9	20.9	27.8	30.0
Scenario 1	18.7	18.9	20.9	27.8	29.9
Scenario 2	18.7	18.9	20.9	27.8	30.0

Table 6.6 Simulation Results: low income countries (Cont)

	2010	2011	2012	2013-2015	2016-2020
Private investment ($US bn)					
Baseline	289.6	289.1	295.9	317.7	364.9
Scenario 1	289.6	289.3	296.1	318.0	365.2
Scenario 2	289.6	289.1	295.9	317.8	365.0
Private Consumption ($US bn)					
Baseline	873.8	903.2	934.9	1002.5	1159.5
Scenario 1	873.8	903.3	935.1	1002.9	1160.2
Scenario 2	873.8	903.2	934.9	1002.6	1159.7
Government expenditure ($US bn)					
Baseline	157.6	165.3	173.5	190.2	228.7
Scenario 1	157.6	165.3	173.5	190.3	228.7
Scenario 2	157.6	165.3	173.5	190.2	228.7
Growth rates of GDP (%)					
Baseline	1.6	3.3	4.1	4.1	4.1
Scenario 1	1.6	3.3	4.1	4.1	4.1
Scenario 2	1.6	3.3	4.1	4.1	4.1

From table 6.3 to table 6.6, increase in FDI can stimulate exports and imports in high income countries and China but changes in imports are quite small, therefore, trade balances are increased. For middle income and low income countries, there are insignificant effects on international trade and trade balance. The effects of real exchange rate are insignificant for all countries and not follow hypothesis of this study.

For domestic consumption, private consumption, investment, and government expenditure are also increased in high income countries and China and change insignificantly in middle income and low income countries. These make GDP increase only in high income countries and China. Therefore, we conclude that, from CAM model, if FDI cannot make the benefits to middle income and low income countries which have small exports share to the World economy compare to other developed countries.

6.5 Summary results from CAM Model

From table 6.3 to table 6.6, we conclude that FDI can make benefits only for high income countries and China which have large exports share to the World economy but not for middle income and low income countries which have small exports share to the World economy.

The results also show that using FDI shock method in scenario 1 will get very small effect on other macroeconomic variables compare to using shock on exports share in scenario 2. These results come from the reasons that all regions in this model use same structure of equations; in other words, all regions use same coefficients in same equations. Although we shock FDI in different regions separately, the effects on exports share in each region will not differ because of the same slope in each region's equations. Therefore, using the shock on export share method seems to be more appropriate because we can define different effect on each region's exports share individually. This should be note as the limitations of this model.

CHAPTER VII
CONCLUSIONS AND RECOMMENDATIONS

7.1 Comparative Study of Macroeconomic Impact of FDI

There are many studies about impact of FDI on economic developments and the conclusions still not clear, most of them use different in methodologies which based on different concept and have different in their strong points and weak points. Therefore, in this study, we try to study the impact of FDI in East Asian countries by using different methodologies to verify the impact of FDI to economic development across three methodologies. In studying the impact of on economic growth and international trade, we use panel cointegration analysis with based on the framework of the solow and endogeneous growth model and gravity model. Secondly, we study the impact of FDI to macro economy by using GTAP model and, thirdly, we also specify a macroeconomic model based on CAM model of world economy framework to analyze the impacts of FDI on macro economy.

According to the growth model we can conclude that FDI has a positive relationship with economic growth in East Asian countries that have appropriate economic conditions such as developed and middle income countries. And from the gravity model, we conclude that FDI can generate host countries' both of exports and imports especially with their trade partners. From GTAP model, we conclude that GDP and welfare also increases largest in high income countries; follow by middle income countries and low income countries. And from the CAM model, it shows that FDI can make benefits only for high income countries and China which have large exports share to the World economy but not for middle income and low income countries which have small exports share to the World economy.

Therefore, we conclude that FDI has a positive relationship with economic development in countries which have more appropriate conditions. The economic conditions are play the important role to support FDI In stimulate economic development. Developed and middle income countries which have more appropriate factors such as high education level, high degree of government investment and trade openness tend to get more benefit from FDI than low income countries.

Table 7.1 Summary results: impacts of FDI

	Growth Model			Gravity Model		
	High income countries	Middle income countries	Low income countries	High income countries	Middle income countries	Low income countries
Growth	+	+	x			
Exports				+	+	+
Imports				+	+	+
Trade Balance						
Exchange rate						
Inflation						
Consumption						
Investment						
Government Expenditure						
Welfare						

+ indicates positive impacts

- indicates negative impacts

x indicates insignificant impacts

mixed indicates different impacts among countries

Table 7.1 Summary results: impacts of FDI (Cont)

	GTAP Model			CAM Model		
	High income countries	Middle income countries	Low income countries	High income countries	Middle income countries	Low income countries
Growth	+	+	+	+	Mixed	x
Exports	Mixed	Mixed	Mixed	+	Mixed	x
Imports	+	+	+	+	Mixed	x
Trade Balance	-	-	-	+	Mixed	x
Exchange rate				x	x	x
Inflation	-	-	-	x	x	x
Consumption	+	+	+	+	Mixed	x
Investment	+	+	+	+	Mixed	x
Government Expenditure	+	+	+	+	Mixed	x
Welfare	+	+	+			

+ indicates positive impacts

- indicates negative impacts

x indicates insignificant impacts

mixed indicates different impacts among countries

7.2 Policy Implications

We can summarize about foreign investment policies from chapter 2 that only Korea, Japan, and Singapore have low restrictions on capital transactions comparable to other East Asian countries. In Thailand, Indonesia, Lao, Philippines, and Malaysia are more restrictive and China has more controls than any other East Asian countries.

For controls on inward investment, most countries including Singapore, Hong Kong, and Thailand either impose no restrictions or have some in specific industries such as banking, public utilities, and manufacture of arms (Japan, Korea, and Indonesia). For outward investment, it is generally more restricted than inward investment. Only Singapore and Hong Kong have no controls on both inbound and outbound direct investment. Countries which have more restrictions usually have certain institutional and structural characteristics that constrain movements of cross-border flows. To get more benefits from foreign capital, these countries should relax the restrictions on cross-border investments. However, at the same time, they should use the appropriate prudential safeguards in order to prevent an increasing in economic volatilities.

Furthermore, according to the results of all models, high income countries and middle income countries tend to get more benefit from FDI than low income countries because they have high education level, high degree of government investment in infrastructure, trade openness and financial linkage. These results verify the hypothesis that FDI can promote more economic development in countries which have more appropriate factors such as high level of infrastructure, large degree of trade openness and financial linkage. Therefore, low income countries which have low level of these economic factors need to conduct the policies that invest more in education, and infrastructure including opening up to trade and financial markets in order to reap a greater benefit from FDI.

7.3 Limitations of the Study and Recommendations for Further Study

In growth model and gravity model, although they conclude that FDI has positive impacts to economic growth and international trade, these models cannot tell the linkage impacts of FDI on other macroeconomic variables, therefore, we try to use macro CGE model and macroeconomic model to cover the impacts of FDI on other macroeconomic variables.

In this study, we use GTAP model which is one type of CGE models and CAM of World economy based on Keynesian macroeconomic model to study the impact of FDI in the next chapter. By the way, there are some limitations in using GTAP model and CAM of World economy. In using GTAP model. The focus of this study is the effects of FDI inflows in the long run. However, the standard GTAP model which is the version that use in this paper cannot extract FDI or others investment flows out from the total investment value. Therefore, we cannot tell that increasing in investment is come from domestic investment or foreign investment. Moreover, the influence of changes in investment will be display on the demand side: the trade balance changes, and the pattern of domestic demand changes. In this case, GTAP (or any other comparative static CGE model) is not well-suited to assessing the long run impacts of capital flows because, in the long run, the most important effects are on the size of the capital stock and on productivity, which are not captured by the GTAP framework. Because of these limitations, this experiment is unable to determine the effect of capital inflows in the long run.

Another problem is from the structure of GTAP model which based on full employment classical assumption. In a general equilibrium closure of GTAP, the identity S-I=X-M must hold. Changes in the capital account must be offset by changes in the current account. In this study, the results show that both savings and investment increase, but the increase in investment is much larger, as this is a direct effect of the shock. This means that the balance of trade will be worse. In this study, we try to solve this problem by increase technology of factors input in host countries to reduce output prices and make host countries exports more goods. However, even though the results

show that host countries' exports are increased, trade balance still deficit. If we want to get trade balance surplus, we have to increase shocking value of factor input technology to decrease more output prices.

In CAM model, firstly, because of some technical problems and missing in data in some countries such as Singapore and Taiwan, we have to group all countries in database into countries groups based on our objective of studies; otherwise we cannot generate data from CAM database to estimate equations in the model. This problem make us cannot study the impacts of FDI on host countries separately. Secondly, because of bilateral data of FDI are not available for all countries for the whole period. In this study, we use total FDI inflows instead, this may be the cause of small effect of FDI to export share of manufacture goods and due to the small change in simulated results. Thirdly, all equations in the model are estimated using panel fixed effect model which assume the difference among region only in intercept term but the slope of variables are equal for all region. Therefore, when we the simulation process by shock value of FDI in host regions, or even we apply directly shock to exports share in order to get more obviously impact, we still get small impacts of FDI and the conclusion of simulated results for all regions are quite similar. Therefore, estimating model using panel fixed effect method with same slope may not appropriate because, actually, countries which have differences in economic conditions tend to receive different benefits from FDI. To solve this problem, we should estimate equations in the model by assume the different in slopes of countries. Finally, the propose of this model is to forecast long term trend of the variables, therefore, this model cannot capture the fluctuation of variables that occur in short run. This problem will make model under estimate many economic variables.

In summary, the limitations in using GTAP model and CAM model in this study are finding the appropriate value of shocking variables in simulation process. In this study, we only apply same degree of risk premium shock and technology shock for same countries groups in GTAP model, and we also apply same amount of FDI and exports share shock for same countries groups in CAM model. In further studies, we should keep these limitations in mind and try to apply more appropriate simulation scenarios.

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