THE DETERMINANTS OF FDI INFLOWS BY INDUSTRY TO ASEAN (INDONESIA, MALAYSIA, PHILIPPINES, THAILAND, AND VIETNAM)

by

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STATEMENT OF DISSERTATION APPROVAL

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ABSTRACT

Foreign direct investment (FDI) has become more important for the economic growth and development of many countries. FDI can deliver capital, a means to pursue global strategic objectives, and a means to access technology and skills to the host country. Attracting FDI is an important issue of concern to many developing nations. The first objective of this study employs the Gravity Model to explore the determinants of FDI by industry in five ASEAN countries (Indonesia, Malaysia, Philippines, Thailand, and Vietnam). The second objective of this study is to analyze the volatility of FDI from three major home sources (the EU, Japan, and the US) to these five host countries to explore the relationship between FDI volatility and an industry's size of FDI.

The empirical results show that GDP of the host and home countries, GDP per capita of the host and home countries, industry imports from home country, industry exports to home country, industry tariff rates, and industry output levels all have a positive effect on FDI. Distance, wage and education have a negative effect on FDI. Population variables of the host and home countries have positive impacts on FDI when GDP per capita variables are constant.

Regarding FDI volatility, the study finds different relations due to the size of FDI in an industry and the volatility of FDI among the three cases. For the EU and Japan, FDI volatility will first increase, and then decrease, according to the size of FDI. In the case of the US with a larger FDI size, volatility will go up, then down, and then go up again.

To my family

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GLOSSARY

ASEAN	Association of Southeast Asian Nations
CEECs	Central and Eastern European countries
CPC	Central Product Classification
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
HS	Harmonized System
ISIC	International Standard Industrial Classification
MFN	Most Favored Nation
MNE	Multinational Enterprise
OECD	Organization for Economic Co-operation and Development
R&D	Research and Development
ROK	Republic of Korea
TNC	Transnational Corporation
TRAINS	Trade Analysis and Information System
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial Development Organization
US	United States
US$	United States Dollar
WAIPA	World Association of Investment Promotion Agencies

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CHAPTER 1

INTRODUCTION AND SUMMARY

1.1 Introduction

Foreign direct investment (FDI) has played an important role in the economic growth and development of many countries in recent decades. The data in Table 1.1 show trends of increased value since 1982 in total FDI inflow and FDI inflow as a share of GDP. Although these measures declined in 2008 due to global recession, FDI is still crucial, especially for developing economies. Host countries acquire capital through the FDI of multinational enterprises (MNEs). This is critical to developing countries with limited ability to raise private capital. FDI can provide host country firms without access to capital markets a means to raise capital in a cost-effective manner. FDI is considered a common mode of entry to a foreign market, a way to access technology and skills, and a way to pursue global strategic objectives and respond to market opportunity.

Policymakers of many countries, especially those with developing economies, work to encourage FDI by providing incentives to MNEs to establish plants or companies in their countries due to the numerous positive effects that can FDI bring to the host countries. Apart from the direct benefit of an increase in the amount of capital in the host country, FDI can also cause spillover effects of benefit to the host through 1) technology transfer, 2) the introduction of new processes, 3) managerial skills, 4) new jobs and employee training, 5) international production networks, and 6) access to markets.

Table 1.1

World FDI Data

World FDI Data	Value at current prices (in billion US$)				
	1982	1990	2004	2007	2008
FDI inflows	58	207	648	1,978	1,697
FDI inward stocks	789	1,941	8,902	15,356	14,909
Gross fixed capital formation	2,798	5,102	8,869	12,367	13,799
GDP (current prices)	12,083	22,163	40,671	54,568	60,854
FDI inflows per Gross fixed capital formation[a]	2.07%	4.06%	7.31%	16.0%	12.3%
FDI inflows per GDP[b]	0.48%	0.93%	1.59%	4.86%	2.79%

Adapted from: World Investment Report 2005: Overview, UNCTAD/ World Investment Report 2008: Overview, UNCTAD/ World Investment Report 2009, UNCTAD.
a. Author calculation by dividing FDI inflow by Gross fixed capital formation.
b. Author calculation by dividing FDI inflows by GDP.

A number of studies find evidence of the positive effect of FDI on host countries. Magnus Bloomstrom and Ari Kokko (1998) claim there are positive FDI effects for the host countries due to various FDI spillovers. These spillover benefits of FDI tend to increase with the level of local capability and competition. According to Laura Alfaro (2003), another positive effect of FDI is to encourage growth in the manufacturing sector. This makes attracting FDI an important issue of concern for many countries. The specific attractions for FDI, however, can be quite different according to characteristics of both industries and countries. It is therefore important to explore the critical country-level factors and industry-level factors that will determine the flow of FDI into the country.

In addition to the level of FDI, the stability of FDI is also significant. According to Robert Lensink and Oliver Morrissey (2006), a high level of FDI volatility has a consistent negative impact on growth for several reasons. The first reason is that FDI promotes growth by decreasing the cost of research and development (R&D) through increasing innovation, whereby an increase in the FDI volatility will decrease incentives to innovate. Another factor is that the volatility of FDI typically can reflect economic or political uncertainty, a major determinant of both growth and investment productivity of, especially for developing countries. The volatility of FDI, as a result, is another important issue to be explored.

1.2 Definition of Foreign Direct Investment

Referring to the Bank of Thailand, direct investment reflects the lasting interest of a nonresident in the economy of the resident entity. An FDI investor can invest in three optional forms of direct investment, which include equity capital, lending to affiliates, or reinvesting earnings. Investment in equity is occurs when direct investors own 10 percent

or more of the ordinary shares or voting power for an incorporated enterprise, or the equivalent form of control for an unincorporated enterprise. Affiliate lending refers to the borrowing and lending of funds between direct investors and subsidiaries, branches and associates. Excluded from this classification are interoffice loans to/from financial institutions, which are treated as "other loans". Reinvested earnings are defined as investment earnings not distributed as dividends nor remitted to direct investors.

The OECD Benchmark Definition, OECD (1996, 7-8) provides the following designation:

> Foreign direct investment reflects the objective of obtaining a lasting interest by a resident entity in one economy (''direct investor'') in an entity resident in an economy other than that of the investor (''direct investment enterprise''). The lasting interest implies the existence of a long-term relationship between the direct investor and the enterprise and a significant degree of influence on the management of the enterprise. Direct investment involves both the initial transaction between the two entities and all subsequent capital transactions between them and among affiliated enterprises, both incorporated and unincorporated.

1.3 Objectives

Two main objectives will be fulfilled in this study. The first objective is to study the determinants of FDI in five of the ASEAN countries including Indonesia, Malaysia, Philippines, Thailand, and Vietnam. The primary question of this objective will be to determine the country-level and the 2-digit-industry-level factors that motivate and attract FDI in the manufacturing sector of these ASEAN countries. This study can then provide direction as to which countries in ASEAN tend to be most attractive to FDI patrons. This objective will also produce a set of guidelines that can be set forth as suggested policy governmental recommendations for those host countries that want to promote and attract increased levels of FDI inflow.

The second study objective is to analyze the FDI variability between three major FDI source home countries and the five ASEAN host countries. The three home countries are the US, Japan, and the EU, which will be viewed as a single entity. The study explores how the volatility of FDI per source depends on the size of FDI. The results are expected to help host country policymakers better understand the essential caution they must use when contemplating any change in country policies that might impact the size of FDI and the resulting effects on FDI volatility.

1.4 Structure of Dissertation

Following this introduction in Chapter 1, the structure of this dissertation is as follows: Chapter 2 begins with a review of literature and other empirical works related to FDI determinants, the Gravity Model, and FDI volatility. Chapter 3 discusses the existing investment regime in ASEAN, including an historical view of FDI data in ASEAN and applicable policies related to FDI. In Chapter 4 the data and methodology for the analysis of the FDI determinants are presented. Chapter 5 presents the empirical results and analysis of the FDI determinants. Chapter 6 explains the data and methodology for the analysis of FDI volatility and presents the results of the analysis of FDI volatility. The conclusion and policy implications of this study will follow in Chapter 7.

CHAPTER 2

LITERATURE REVIEW

This chapter examines the literature regarding FDI along with issues related to the theoretical framework and empirical evidence. The first section discusses the theoretical framework of FDI. The second component presents the theoretical framework of the Gravity Model and the empirical results as pertaining to the test for FDI determinants.

2.1 Theoretical Framework of Foreign Direct Investment

2.1.1 Types of MNEs and Reasons for Foreign Direct Investment

Richard E. Caves (1982) considered the MNE as an economic organization. According to Caves, multiplant firms can be divided into 3 groups: 1) horizontal multiplant enterprises, 2) vertically integrated MNEs, and 3) portfolio diversification and the diversified MNEs. Caves explains each grouping and his supporting reasons for MNE differentiation, which can be summarized as follows:

2.1.1.1 Horizontal multiplant enterprise. Horizontal MNEs will exist only if control and operation integration leads to lower costs under those of maintaining separate managements. An important issue for horizontal MNEs concerns intangible assets such as technology or specific skills, which often must deal with problems of market failure. They are public goods that Caves contends suffer from opportunism and “impactedness.”

Other firms can use newly invented technology with little extra cost; not paying as much for the knowledge as the knowledge is worth it to them. Uncertainty about the accuracy of knowledge further amplifies Caves' problem of impactedness. In response, several firms tend to band together into one MNE to share the intangible assets and avoid those problems. Scale economics and cost minimization, especially transactional economies, are another issue that promotes the existence of MNEs. The outbound shipment network allows MNEs the free movement of goods to market locations that have higher demand.

2.1.1.2 Vertically integrated MNEs. The internalization of an intermediate goods market becomes the crucial issue of vertically integrated MNEs' concern. Without homogeneous intermediate goods, changing partners or the selling of intermediate goods leads to substantial costs to the buyers due to the costs of testing and adapting to new or similar products. Long-term alliances become very important to the MNEs, so as to avoid uncertainty and disappointment when switching from problematic transaction partners. There are problems of fair bargaining, however, for both parties in the contract. The structure of a vertically integrated MNE provides one solution for these problems.

2.1.1.3 Portfolio diversification and the diversified MNE. Firms tend to locate plants in several countries in order to internationally diversify risk because adverse shocks, such as recessions, are not often correlated with other countries. Even though investing abroad leads to extra costs and the risks of adding activities, there is evidence that diversifying in domestic product markets and investing abroad are sound alternatives for mature companies.

Caves (1982) also indicated that there is a relationship between the FDI through MNEs and international economic activities. Typically, firms usually face trade-offs

between FDI (producing goods abroad) and exporting (producing domestically), especially when firms face increasing marginal costs. Anything that might favor foreign investment (e.g., tariffs) will discourage the use of exports. In this situation, firms can find more profit from foreign investments. With free-trade equilibrium, however, MNEs have no incentive to move capital internationally. Firms will invest abroad more heavily when trade is restricted to substitute for a decrease in exports. According to the capital arbitrage assumption, a "capital-rich country" (home) tends to export capital-intensive goods. The rentals to this capital-rich country will increase and workers' wages will fall with the expansion of exports. This results in an increase in unemployment in the short run and a decrease in real wages in the long run in the home country. The outcome is the opposite in the foreign country (host). These examinations not only reflect on the substitution between trade and horizontal FDI, they show that FDI can impact income distribution.

Regarding vertical FDI, the primary reason for this type of involvement occurs when MNEs desire to internalize their markets for intermediate goods. Namely, these foreign investments are driven by relative factor costs and resource endowments. They tend to create more trade by increasing exports of capital equipment and factor services from the home country to a plant in the host country and, in turn, exports of resource-based products from the host country to the home country. Furthermore, an MNE's presence stimulates demand for the MNE's and other products that originate in the MNE's home country. In this situation, trade and FDI are complements.

International trade, however, can possibly adjust or eliminate the effects of capital outflow for the home country if the country is relatively small because the terms of trade

are a given. The reason for this is that lower wages lead to more profits in labor-intensive goods, which are the country's imports. Factors of production will move to import-competing sectors until the capital-labor ratio in all sectors retreats to the levels before being disturbed by the capital outflow. Hence, the effects of capital outflow in a small country will be eliminated. Nevertheless, there is also some evidence against the claims of the capital-arbitrage assumption. Namely, that most countries are both home and host for MNEs because MNEs move in all directions across the world.

Technology and productivity are also important issues relating to MNEs and foreign investment. The MNE has an crucial role in the production of new knowledge or technology. The MNE encourages new knowledge by pulling R&D toward the parent's headquarters, which acquires benefits from more efficient supervision and economies of scale. The next step is for the MNE to disperse the knowledge to its subsidiaries leading to technological transfer. Broader scale implications of national welfare come next into play as the MNE home country will lose to other foreign and world interests if the home country cannot collect rents on invented technology as it disseminates to other countries. Furthermore, as technology dissemination occurs through the MNE's international capital outflow, foreign entities can benefit from the resulting capital inflow. Hence, technology transfers and capital movements can be substitutes for one another when independent.

2.1.2 The Determinants of FDI for Host Countries

According to UNCTAD 1998, there are several factors that influence the FDI position in host countries. Host country determinants of FDI consist of 1) a host country policy framework for FDI, 2) business facilitation, and 3) economic determinants.

2.1.2.1 Host country policy framework for FDI. FDI cannot take place unless a country has an openness to FDI. Even though this openness to FDI is necessary for attracting FDI, it is not by itself a sufficient determinant and other determinants have important roles to play. Trade policy plays the most prominent role. For example, some Asian countries have used both FDI and trade policies to encourage inward FDI and contribute to their export-oriented economic strategies. International investment agreement is also an important determinant. Namely, the host country should provide for fair and equitable treatment between domestic and foreign investors, including legal protection and guarantees against noncommercial risk. Furthermore, the host country should strengthen market controls in terms of competition (e.g., antitrust laws) and mergers and acquisitions or M&A (e.g., privatization).

As a result of interdependency and globalization, macroeconomic policies and macro-organizational policies also become determinants of FDI. Monetary and fiscal policies that determine the economic stability of a country, such as inflation rate and external and budgetary balances, can influence FDI. Tax policy and exchange rate policy will also have an influence on FDI. Regarding macro-organizational policies, those influencing the industry composition of manufacturing are of primary focus and include the spatial composition of economic activities, the functional composition of activities, and the composition of activities by type of ownership and intensity of competition. Following these, policies affecting the supply and quality of productive resources are also important, including educational and health policies.

2.1.2.2 Business facilitation. For a country that wants to attract or regain investor attention, promotional activities have become necessary. Organizations such as the World

Association of Investment Promotion Agencies (WAIPA) assist members in a variety of these image-building efforts. Investment-facilitation services are another important part of promotional activities. These services consist of counseling, accelerating the several stages of the approval process, providing assistance in obtaining all the needed permits, and providing after-investment services. Business facilitation measures, however, can only hold a supporting role as an FDI determinant. They are rarely the decisive factors. Host countries may not be able to attract FDI if they do not possess the basic economic determinants as discussed in the next topic.

2.1.2.3 Economic determinants. The core economic determinants of FDI in host countries can be divided into three basic groups based on the specific type of FDI as classified by the motives of the transnational corporations (TNCs).

The first group is market-seeking FDI. The determinants for attracting market-seeking FDI are national markets and include market size (i.e., population), per capita income, and the market growth of the host country. National markets are important for many service TNCs because most services are nontradable and can be delivered to foreign markets only through establishment abroad. Another determinant is consumer preference, wherein a TNC must consider whether their products meet the host country consumer's preferences or not. The last determinant is access to regional and global markets. Host countries with significant accessibility will be more attractive for FDI.

The second group is resource/asset-seeking FDI. Even though natural resources are a prominent FDI determinant, investment may or may not take place in countries with abundant resources. Investment will most likely take place in countries that possess abundant resources, yet lack the technical skills needed to extract or sell these raw

materials to the rest of the world. Physical infrastructure facilities for transport of the raw materials out of the host country and on to final destinations (e.g., roads, ports, power, and telecommunication) are another key factor of attraction to resource-oriented FDI. The availability of low-cost unskilled labor is another determinant for TNCs that require low costs of production. Specific determinants such as skilled labor, technological, innovatory and other created assets can be determinants of FDI, depending upon industry need.

The third grouping is efficiency-seeking FDI. The determinants of this category may be impacted by the results of a regional integration agreement. These determinants include 1) the cost of resources and assets, as adjusted for productivity of labor resources after the regional integration of production, 2) other input costs such as transport and communication costs, and 3) membership of regional integration agreements that facilitate the establishment of regional corporate networks.

2.1.3 The Eclectic or OLI Paradigm

The eclectic paradigm of John H. Dunning (1980) is a general framework for explaining international production and FDI. The eclectic paradigm contends that the propensity of an enterprise to bring FDI into a host country depends on three important advantages as follows:

2.1.3.1 Ownership-specific (O) advantages. An enterprise possessing or being able to acquire certain assets, which their competitors or like enterprises of other countries do not possess, affects the capability and willingness of that enterprise to produce in foreign locations. Such ownership-specific advantages help determine FDI since these assets equate to resources and capabilities for generating future income streams. These assets are both tangible, such as natural resources, manpower, capital, and

proximity to markets, and intangible, such as information and technology, managerial skills, marketing and entrepreneurial skills, organizational skills, and favored market access for intermediate or final goods. Ownership forms may include proprietary rights of use, or a commercial monopoly, or an exclusive control over specific market outlets.

2.1.3.2 Location-specific (L) advantages. The ability of an enterprise to obtain ownership-specific advantage is also related to the host country's location endowment. Location-specific advantages explain the decision on where FDI occurs, i.e., whether an enterprise will supply each foreign market by exports or by local production. This helps explain the home country focus of their FDI in some specific industries over other home countries. According to Dunning (1979) and referrenced by John H. Dunning and Sarianna M Lundan (2008), an example of this is the comparative advantage of Japanese firms in producing textiles and clothing abroad, contrasted with a U.S. advantage in producing transport equipment abroad. Home countries will exploit ownership-specific advantage wherever they can gain maximal benefits with minimal transfer costs.

2.1.3.3 Internalization (I) advantages. Ownership-specific advantages are necessary but not sufficient to explain FDI since an enterprise may choose to sell a proprietary processes rather than attempt to exploit it via FDI. Internalization advantages allow firms an option to exploit ownership endowments and location endowments by producing abroad. Incentive to internalize ownership and location endowments is created since the firm can avoid the risk and disadvantage of market and price system imperfections and/or the fiat of public authority.

The types of international production employed by a firm can also impact the combined OLI configuration. Table 2.1 provides some determining factors of OLI per

Table 2.1

Types of International Production and Some Determining Factors

Types of International Production	(O) Ownership Advantages	(L) Location Advantages	(I) Internalization Advantages
Natural resource seeking	Capital, technology, access to markets, and complementary assets;	natural resources endowment, infrastructure for transport and communications; tax incentives	stability of supplies at right price and market control
Market seeking	Capital, technology, organizational skills, and information management; R&D; economies of scale; ability to create brand loyalty	Material and labor costs; market size; government policy (e.g., toward regulations and import controls, investment incentives, etc.)	A desire to reduce transaction or information costs, and to protect property rights
Efficiency seeking (a) of products (b) of processes	As above, but include access to market; economies of scope; geographical diversification and international sourcing of inputs	(a) Economies of product or specialization and concentration on process (b) Low costs of labor; incentives to local production; a favorable business environment	(a) As for second category, include gains from economies of common governance (b) The economies of vertical integration and horizontal diversification

Adapted from: Multinational Enterprises and the Global Economy (2008)

type of international production. Table 2.2 illustrates how OLI characteristics may vary according to different levels of country- and industry-specific circumstances.

2.2 Gravity Model and FDI

2.2.1 Theoretical Framework of the Gravity Model

The Gravity Model is essentially based on the Newtonian Law of Gravitation. It states that the movements of goods or information are related to their population, income, and the distances between them. Specifically, if two objects, located distance d apart, each has mass M_1 and M_2, the force of gravity F_g between the objects is

$$F_g = G \cdot \frac{M_1 \cdot M_2}{d^2} \qquad (2.1)$$

where G is a constant reflecting the magnitude of this relationship.

According to James E. Anderson (1979), the Gravity Model uses the pure expenditure system model and is based on a hypothesis of identical homothetic preferences across regions. The gravity equation is specified as

$$M_{ijk} = \alpha_k Y_i^{\beta_k} Y_j^{\gamma_k} N_j^{\xi_k} N_i^{\varepsilon_k} d_{ij}^{\mu_k} U_{ijk}, \qquad (2.2)$$

where M_{ijk} is the dollar flow of good k from country i to country j, Y_i and Y_j are income in i and j, N_i and N_j are population in i and j, d_{ij} is the distance between i and j, and U is an error term.

Table 2.2

Some Illustrations of OLI Characteristics According to Country- and Industry -Specific Circumstances

OLI Variables	Structural Variables	
	Country or Region	Industry
Ownership	Factor endowments and market size; government policy towards innovation, proprietary rights protection, competition, education and training, and industrial structure; country's organizational culture and wealth-creating ethos; corporate governance and interfirm rivalry and/or cooperation; quality of financial institutions; role of the state in favorable environment	Degree of product or process technological intensity; innovations; extent of product differentiation; production economies; transaction economies; favored access to inputs and/or markets
Location	Physical, psychic and institutional distance between countries; government intervention (e.g., tariffs, taxes, assistance to foreign investors); availability/promotion of clusters of related activities	Origin and distribution of immobile resources; transport costs; industry-specific tariff and non-tariff barriers; competition between firms in industry; tax incentives, energy and communication costs
Internalization	Government intervention and policies encouraging MNEs to internalize cross-border transactions; government policy towards mergers; differences in transaction costs, enforcement of contracts, buyer uncertainty etc.; level of technological, educational, communications, and institutional infrastructure in host countries, and their ability to absorb contractual resource transfers	Extent to which vertical or horizontal integration is possible/desirable; extent to which internalizing advantages can be captured in contractual agreement; use made of ownership advantages; extent to which local firms have complementary advantages to those of foreign firms; extent to which opportunities for output specialization and international division of labor exist

Adapted from: Multinational Enterprises and the Global Economy (2008)

In addition, Robert C. Feenstra (2004) starts with a simple gravity equation with the assumption of same prices across all countries. Let y^i_k denote country i's production of good k (in terms of value of production) and s_j denote country j's share of world GDP. Then, $s_j = Y^j/Y^w$. Total GDP of each country is $Y^i = \sum_{k=1}^{N} y_k^i$ and world GDP is $Y^w = \sum_{i=1}^{C} y^i$, where N is a number of products and C is a number of countries. Then, the exports from country i to country j of product k and the summation of those exports over all product k are as follows:

$$X_k^{ij} = s^j y_k^i \qquad (2.3), \text{ and}$$

$$X^{ij} = s^j s^i Y^w = X^{ji}. \qquad (2.4)$$

Summing the exports of all products between two countries i and j, creates a simple gravity model, which reflects bilateral trade between the two countries as follows:

$$X^{ij} + X^{ji} = \left(\frac{2}{Y^w}\right) Y^i Y^j = 2 s^i s^j Y^w. \qquad (2.5)$$

Next, we add border effects, such as transportation costs and tariffs, to the Gravity Model. With border effects, prices are not equalized across countries. Let c_k^{ij} denote the exports from country i to country j of good k. Then, the utility function for a country is

$$U^j = \sum_{i=1}^{C} \sum_{k=1}^{N^i} (c_k^{ij})^{(\sigma-1)/\sigma}. \qquad (2.6)$$

Let p^{ij} denote prices, including transport costs, from country i to country j. Thus $p^{ij} = T^{ij} p^{i}$, where T^{ij} indicates product units shipped to country j ($T^{ii} = 1$ and $T^{ij} \geq 1$), and p^{i} is the local price for goods produced in country i. Then, the utility function becomes

$$U^{j} = \sum_{i=1}^{C} N^{i} (c_{k}^{ij})^{(\sigma-1)/\sigma}, \tag{2.7}$$

where c^{ij} is the consumption of any product sent from country i to country j. Maximizing this equation (2.7) with respect to budget constraints

$$Y^{j} = \sum_{i=1}^{C} N^{i} p^{ij} c^{ij}, \tag{2.8}$$

The gravity equation is defined as

$$X^{ij} = N^{i} Y^{j} \left(\frac{p^{ij}}{p^{j}} \right)^{1-\sigma}. \tag{2.9}$$

Let GDP in country i be $Y^{i} = N^{i} p^{i} \bar{y}$ and $p^{ij} = T^{ij} p^{i}$. Next, substitute this into equation (2.9) and obtain

$$X^{ij} = \frac{Y^{i} Y^{j}}{p^{i} \bar{y}} \left(\frac{p^{ij}}{p^{j}} \right)^{1-\sigma} = \frac{Y^{i} Y^{j}}{p^{i\sigma} \bar{y}} \left(\frac{T^{ij}}{p^{j}} \right)^{1-\sigma}. \tag{2.10}$$

Transportation costs depend on the distance between countries. So, the amounts of exports between two countries also depend on distance.

The Gravity Model can be applied to bilateral FDI in a similar way as the model is applied to bilateral trade. FDI is considered as a force of gravity, which depends on the GDP (mass) of two countries and the distance between those two countries.

2.2.2 Empirical Evidence of the Gravity Model and FDI

Michael Frenkel, Katja Funke, and Georg Stadtmann (2004) used the Gravity Model to explain bilateral FDI flows to emerging economies during 1992-1995. Their study was based on the notion that FDI home and host country specificities, together with gravity force, were important determinants of the FDI flows between each country during 1994-2000. They found that the Gravity Model could successfully be applied to FDI. The traditional gravity equation's explanatory variables of market size and distance played important roles in the model. They also found that growth and risk in host countries were vital contributing determinants of FDI. Alan Bevan and Saul Estrin (2004) also used the Gravity Model to analyze the determinants of foreign direct investment into European transition economies and found unit labor costs, gravity factors, and market size to be the primary determinants of FDI flows. In addition, Rabin Hattari, Ramkishen S. Rajan, and Shandre Thangavelu (2008) used the Gravity Model to investigate FDI determinants in the case of flows between intra-ASEAN countries, China, and India. They found that a larger GDP of host country and home country, lower political risks, and lower corporate taxes would attract more FDI, whereas distance had a negative effect on FDI. The effect of exports on FDI was ambiguous depending on the type of FDI.

The positive effect of GDP on FDI is supported by Claudia Buch, Jorn Kleinert, and Farid Toubla (2003), who used the Gravity Model to examine determinants of FDI stocks. They further found that the volume of bilateral trade (a proxy for the degree of integration between two countries) and GDP per capita (a proxy for purchasing power) had positive effects on FDI in the Central and Eastern European countries (CEECs). Paul Brenton, Francesca D. Mauro, and Matthias Lucke (1999) employed the Gravity Model to study the impact of integration between the CEECs on FDI and found that there was an increase of horizontal and vertical FDI in the CEECs.

Svetlana Ledyaeva and Mikael Linden (2006) analyzed the factors that determine the presence of foreign firms from six source countries (namely Great Britain, Finland, Germany, Belorussia, Ukraine and Kazakhstan) in 76 Russian regions. They used a recently compiled cross-sectional data set for the period of 1998-2002 and examined the data with different specifications of a Gravity Model. The dependent variables included gross regional product, source country GDP, distance, concentration of business activities, and natural resources. They used dummy variables for each source country to check the effect of cultural closeness, dummy variables for the Moscow regions to check capital city advantage, along with the ratio of people with university and college degrees in the total population. The results showed that gross production of host regions and source countries, agglomeration effect, capital city advantage, cultural closeness and skilled labor abundance were positively related to the number of foreign firms in a Russian region. There was a negative relation concerning the distance between host regions and source countries and the number of foreign firms.

Giuseppina MC. Talamo (2003) estimated the determinants of direct foreign investment flow using the gravity equation. The analysis included traditional gravity variables such as size, level of development, distance, and common language along with institutional variables such as shareholder protection, openness to FDI, and corporate tax. The study used the available panel data of 29 source countries and 60 host countries during the period of 1980-2001. The results show that FDI flows were positively related to development, population, common language, shareholder protection, and openness to foreign investors. Conversely, FDI flows were negatively related with distance and corporate tax. He conducted further analysis by including the fixed assets of the source countries into the model. The study conclusions showed the same sign results for all variables as the previous run although corporate tax became insignificant.

Douglas P. Woodward (1992) analyzed Japanese investment in the United States based on micro data representing individual location choices for the period of 1980-1989. The explanatory variables were divided into State level and County level. State variables consisted of market size, unionization rate, unemployment benefits, climate, corporate profit tax, domestic unitary tax, worldwide unitary tax, state industrial programs, the early establishment of Japanese trade offices, and land area. Variables for the County level included manufacturing agglomeration, population, interstate connection, wage rate, productivity, education, density of black population, poverty rate, the above-poverty black population rate, unemployment rate, property taxes, and land area. The results showed that Japanese investors preferred States with strong markets and low unionization rates. State unitary tax methods were strongly opposed by Japanese companies. The early establishment of a Japanese office for trade was significant. At the County level,

Japanese tended to avoid the less-developed (poor) areas of the county and preferred counties characterized by manufacturing agglomeration, low rates of unemployment and poverty, and concentrations of educated, productive workers. Interstate highway connections were important for plants in the rural and semirural automotive corridor.

Eduardo L. Yeyati, Ernesto Stein, and Christian Daude (2003) found that regional integration was important to attract FDI into a region but that FDI increases tend to be unevenly distributed to the countries within a region. As a result, the country with the highest overall attractiveness would be the winner. Their study used two dummy variables to measure country attractiveness, with one dummy variable for countries belonging to a regional integration area (RIA) and the other dummy variable for countries that belonged to more than one RIA. Host country GDP, home country GDP, openness, factor endowments, and privatization of public companies all had positive effects on FDI. In concert with other studies, they found a negative impact of distance on FDI.

To examine the bilateral sales of multinational firms, Jorn Kleinert and Farid Toubal (2010) derived gravity equations from three varied models. Those included are foreign production with domestic inputs, fixed cost increasing by distance, and factor-proportions theory. Their results showed that home and host country GDP had a positive effect on real foreign affiliate sales, whereas distance had a negative impact. Real affiliate sales, furthermore, will rise when there is an abundance of high-skilled labor of the home country relative to the host country.

There are some studies related to FDI determinants that do not use a gravity equation approach. Florence Jaumotte (2004) analyzed the determinants of FDI inflows to 71 developing countries and the impact of a regional trade agreement (RTA). Her

domestic model (without RTA variables) found lagging FDI, although education, financial stability, openness, along with domestic market size and growth had positive impacts on FDI. The regional model (with RTA variables) showed the domestic market as no longer significant, but that regional market size has a positive effect on FDI.

Brian J. Artige and Ann E. Nicolini (2006) examined the determinants of FDI inflows per capita by industry level in each of three European regions. They found a positive relationship between GDP per capita and FDI per capital for all three regions. The other study determinants generate different effects across the regions. In Catalunya, where FDI inflows are not concentrated into a single sector, labor productivity appears to have no influence on FDI, whereas market size, openness, R&D effort, and human capital have a positive effect on FDI. In Baden-Wurttemberg, where FDI inflows have little sector concentration, and Lombardia, an attractive FDI destination for traditional manufacturing with much less FDI per capita than Baden-Wurttemberg, both market size and labor productivity are key determinants. R&D and human capital, however, are not significant determinants for these two regions.

2.3 FDI Volatility

There is a great deal of literature that examines the impacts of volatility of many variables (such as government spending, real exchange rate, and money growth) on economics. Understanding FDI volatility is another issue of concern, especially for the FDI host countries. The measurement of FDI volatility by using the coefficient of variation of an FDI series can be found in several studies such as Robert Osei, Oliver Morrissey, and Robert Lensink (2002) and Robert Lensink and Oliver Morrissey (2006). Osei, Morrissey, and Lensink (2002) considered the importance and volatility of four

types of capital flows (debts, official flows, FDI, and other private flows) to three country groups (low, low middle, and upper middle income) over the period of 1970-1997. They found that debt flows have the highest volatility and official flows have the lowest volatility. Countries with low incomes experience a higher level of FDI volatility than the other two groups, but counties with low middle incomes had the lowest overall volatility of FDI. They also found that FDI volatility has a strong negative relation with GDP growth. Lensink and Morrissey (2006) found a positive effect of FDI on growth, but a negative effect of volatility of FDI inflows on growth through an increase in the expected costs of innovation. The negative impact of FDI volatility on growth, however, is not as important as other determinants such as the level of FDI and initial income.

A stable stream of FDI could support the planning of investment policies, whereas unstable streams of FDI could discourage investment and have a negative effect on growth. Alberto Gabriele, Korkut Baratav, and Ashok Parikh (2000) examined the volatility of various components of capital flows to developing countries. They found that the volatility of total capital flows and their components increased during 1990-1998 and that the increasingly volatility of FDI might cause macroeconomic instability and contribute to a financial crisis, such as the East Asia Crisis. Jariia Duasa (2007) studied the relationship between FDI and growth in the case of Malaysia. Results showed that FDI contributes to the stability of growth and that growth contributed to the stability of FDI. The stability of both growth and FDI are important for the Malaysian economy's sustainability in the long run. James P. Gander, Stephen E. Reynolds, and Richard Fowles (2009) examined the patterns of FDI inflows by industry to ASEAN host members from EU, Japan, the US, and Singapore source countries using a Weibull CDF and Gumbel

CDF. The study was based on the thesis that with the general equilibrium of capital markets, the return on capital is equalized everywhere and investment will be randomly allocated. They found that the patterns of these FDI inflows to be random. This can imply that the capital market is in general equilibrium.

CHAPTER 3

INVESTMENT REGIME IN ASEAN COUNTRIES

This chapter presents the investment regime in ASEAN. The first part discusses various FDI trends in the ASEAN economies and the second part illustrates current ASEAN policies toward FDI.

3.1. FDI Trends

The trends of FDI inflows in ASEAN countries tend to correlate with general global FDI trends. Referring to Table 3.1, FDI inflows in ASEAN were increasing as global FDI inflows were increasing from 2004 to 2008. When global FDI inflows dropped in 2008, ASEAN inflows of FDI also decreased. Despite of an increase in inward FDI level, the ASEAN share of global inward FDI decreased from 4.99% in 2004 to 3.51% in 2008. This evidence indicates a shift of inward FDI allocation to other regions. The share of global FDI for the African region is increasing from 2.53 (about half of the ASEAN share) in 2004 to 5.16 in 2008 (a number that is more than the ASEAN share). China, one of the primary ASEAN competitors for FDI, has had its share of global inward FDI drop dramatically from 8.53% in 2004 to 4.98% in 2007. China's share of global FDI, however, rebounded to 6.38% in 2008. The effort to attract more FDI, as a result, is still a challenge for the entire ASEAN region.

Table 3.1

Global FDI Flows (in US$ billion) and Share of Global FDI Flows (%)[a] of Some Interesting Regions

	2004		2005		2006		2007		2008	
	Level	Share of Global FDI Flows	Level	Share of Global FDI Flows	Level	Share of Global FDI Flows	Level	Share of Global FDI Flows	Level	Share of Global FDI Flows
World	710.8	100.00	916.3	100	1461.1	100	1978.8	100	1697.4	100
Africa	18	2.53	29.5	3.22	57.1	3.91	69.2	3.50	87.6	5.16
Latin America and the Caribbean	94.3	13.27	76.4	8.34	93.3	6.39	127.5	6.44	144.4	8.51
South-East Europe and CIS	40.3	5.67	31	3.38	54.5	3.73	90.9	4.59	114.4	6.74
Asia	156.6	22.03	199.6	21.78	282.1	19.31	331.4	16.75	387.8	22.85
ASEAN	35.5	4.99	39.6	4.32	55	3.76	69.9	3.53	59.7	3.52
China	60.6	8.53	72.4	7.90	72.7	4.98	83.5	4.22	108.3	6.38

Adapted from: World Investment Report 2009, UNCTAD
a. Author's Calculation

FDI inflows by individual country within the ASEAN region from 1995 to 2008 are displayed in Table 3.2. FDI inflows to the ASEAN region have more than doubled from US$ 28,164.3 million in 1995 to 60,596.1 million in 2008. Year 2007 was a strong year for ASEAN with inflows of 69,481.6 million. FDI flows from 1995 to 2008 to the region were highly concentrated to three main countries consisting of Singapore (46.1%), Thailand (17.0%) and Malaysia (13.8%). Despite the fluctuations of Singapore's FDI inflows from 1995 to 2008, Singapore has always been the largest recipient of FDI in the ASEAN region. Both Thailand and Malaysia faced a decline in FDI inflows in the early 2000s. For Thailand, FDI rebounded and again increased from 2003 until inflows reached US$ 11,238.1 million in 2007. Indonesia has suffered negative FDI inflows since the 1998 Asian Crisis with huge repayments of intracompany loans to foreign affiliates. Indonesia's FDI inflows, however, increased dramatically to US$ 8,336 million in 2005. After a huge drop in 2001, Malaysia's FDI inflows fluctuated until 2006 when FDI rebounded to US$ 6,059.7 million. FDI flows to the Philippines have fluctuated during this period with no clear pattern. Vietnam's FDI inflows were relatively stable from 1995 until 2007 when Vietnam's FDI increased substantially from US$ 2,400 million in 2006 to US$ 6,739 million in 2007. Vietnam's increase continued to US$ 8,050 million in 2008, which was close to the level of Malaysia's FDI for that same year. This expansion had made Vietnam one of ASEAN's most popular FDI host countries. For other ASEAN nations (Brunei, Cambodia, Laos, and Myanmar), FDI inflows have been rather low.

In 2008, most ASEAN countries experienced a decrease in FDI flows except for Indonesia and Vietnam. The rate of decrease was highest in the Philippines (47.87%), Laos (29.58%) and Singapore (27.73%). In absolute values, the decline in ASEAN

Table 3.2

FDI Inflows into ASEAN by Host Country, 1995-2008 (in US$ million)

Host	1995	1996	1997	1998	1999	2000	2001
Brunei	582.80	653.60	701.70	573.30	747.60	549.20	526.40
Cambodia	150.70	293.70	168.10	242.90	232.30	148.50	149.40
Indonesia	4,346.00	6,194.00	4,678.00	-356.00	-2,745.10	-4,550.00	-3,278.50
Lao PDR	88.40	128.00	86.30	45.30	51.60	34.00	23.90
Malaysia	5,815.00	7,297.00	6,323.00	2,714.00	3,895.10	3,787.60	553.90
Myanmar	317.60	580.70	878.80	683.40	304.20	208.00	192.00
Philippines	1,510.70	1,587.80	1,244.60	2,271.60	1,247.00	2,239.60	195.00
Singapore	11,502.70	9,302.90	13,532.50	7,594.30	16,067.40	16,485.40	15,649.00
Thailand	2,070.00	2,337.60	3,881.80	7,491.20	6,090.80	3,350.30	5,061.00
Viet Nam	1,780.40	1,803.00	2,587.30	1,700.00	1,483.90	1,288.70	1,300.30
ASEAN	28,164.30	30,178.30	34,082.10	22,960.00	27,374.80	23,541.30	20,372.40

Table 3.2 Continued

Host	2002	2003	2004	2005	2006	2007	2008
Brunei	1,035.30	3,123.00	212.00	288.50	433.50	260.20	239.20
Cambodia	145.10	84.00	131.40	381.20	483.20	867.30	815.20
Indonesia	144.90	-596.10	1,894.50	8,336.00	4,913.80	6,928.30	8,339.80
Lao PDR	25.40	19.50	16.90	27.70	187.40	323.50	227.80
Malaysia	3,203.40	2,473.20	4,623.90	4,063.60	6,059.70	8,401.20	8,053.00
Myanmar	191.40	291.20	251.10	235.90	427.80	257.70	714.80
Philippines	1,542.00	490.80	688.00	1,854.00	2,921.00	2,916.00	1,520.00
Singapore	7,200.00	11,664.00	20,052.20	14,373.20	27,681.10	31,550.30	22,801.80
Thailand	3,335.00	5,235.00	5,862.00	8,048.10	9,459.60	11,238.10	9,834.50
Viet Nam	1,200.10	1,450.10	1,610.10	2,020.80	2,400.00	6,739.00	8,050.00
ASEAN	18,022.60	24,234.70	35,342.10	39,629.00	54,967.10	69,481.60	60,596.10

Adapted from: ASEAN Statistical Yearbook 2008, the ASEAN Secretariat

FDI inflows, however, can be attributed primarily to the drop in Singapore's FDI inflows. Contributing to the ASEAN decrease, the reductions of FDI inflows to the nations of the Philippines, Thailand, and Malaysia were also significant. FDI inflows to Indonesia and Vietnam, in contrast, increased by 20.37% and 19.45%, respectively, reflecting the increasingly favorable economic conditions in these two countries.

The sources of ASEAN investment via FDI need also be examined. FDI inflows to ASEAN from ASEAN and other major non-ASEAN countries are demonstrated in Table 3.3. The EU is the largest source of FDI for the entire ASEAN region. FDI flows from the EU accounted for 27.32% of cumulative FDI inflow from 2000 to 2008. Cumulative FDI flows from the US for the same period were about 21.77%. The shares of cumulative FDI for these years from Japan and ASEAN were 6.20% and 6.57%, respectively. FDI outflows from the EU fluctuated during this period and reached the highest level of US$ 18,383.5 million in 2007. Outward FDI from the EU dropped again to US$ 12,445.3 million in 2008. FDI flows from the US were also prone to fluctuation and reached US$ 6,345.6 million in 2007. The highest level of US FDI outflow was in the year 2000 with a US$ 7,292.7 million investment. After a significant decline in 2000[1], FDI flows from Japan to ASEAN increased from US$ 502.8 million in 2000 to US$ 10,222.8 million in 2005.

The role of FDI outflows from the emerging economies of East Asia (Hong Kong, Republic of Korea (ROK), China, and Taiwan) has increased during this period, on average. This is especially true for the ROK, which used to be a recipient of FDI from ASEAN during 2000 to 2001. ROK became a source of FDI for ASEAN in 2002 with

[1] Referring to ASEAN secretariat (2007), FDI inflows from Japan in 1999 was 1,688.2 million.

Table 3.3

FDI Inflows into ASEAN by Source Country, 2000-2008 (in US$ million)

Source Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2000-2008
ASEAN	761.90	2,526.50	3,812.90	2,702.00	2,958.60	4,217.70	7,602.30	9,408.60	11,070.80	45,061.30
Hong Kong	1,128.30	-411.3	487.4	225.2	433.2	586.4	1,278.80	1,622.40	619.5	5,969.90
Republic of Korea	-42.50	-240.3	176.5	550	828.2	507	1,253.80	3,124.70	1,279.10	7,436.50
Taiwan	375.80	2,703.40	446.8	573	377.4	-6.8	785.30	872.30	1,463.10	7,590.30
China	-133.40	144	-71.9	186.6	735	537.7	1,016.20	1,226.90	1,497.30	5,138.40
Japan	502.80	2,204.00	3,026.40	3,908.40	5,667.40	6,655.00	10,222.80	8,382.00	7,653.60	48,222.40
EU-25	13,469.10	6,946.40	3,743.50	6,679.20	11,270.20	10,015.60	10,672.20	18,383.50	12,445.30	93,625.00
The US	7,292.70	4,816.90	-212.9	1,494.70	4,384.40	3,945.80	3,406.40	6,345.60	3,392.50	34,866.10
Others	372.10	1,940.80	6,378.90	7,747.60	8,546.70	12,497.60	17,132.40	19,148.60	21,004.80	94,769.50

Adapted from: ASEAN Statistical Yearbook 2008, the ASEAN Secretariat

inflows of US$ 176.5 million. The FDI outflows from ROK reached the highest level of US$ 3,124.7 million in the year 2007. Similar to the ROK, the case of China is also interesting. FDI flows from China increased dramatically from US$ 144 million in 2001 to US$ 1,226.9 million in 2007, i.e., FDI outflows from China increased almost ten fold in just six years. FDI flows from Hong Kong and Taiwan have fluctuated during this period. The global instability in the 2008 financial markets resulted in a decline of FDI outflows from most of these home countries, with the exceptions of Taiwan and China. FDI flows from the U.S. were the most impacted, dropping 46.53% to US$ 3,392.5 million. FDI flows from EU were also down, with a decrease of 32.6% to US$ 12,445.3 million.

The details of Intra-ASEAN FDI flows are detailed in Table 3.4. Intra-ASEAN FDI flow has increased through the years with the exception of 2003. Despite declines in FDI from developed countries, intra-ASEAN FDI flows increased from US$ 761.7 million in 2000 to 11,070.8 million in 2008. Singapore is the biggest source of Intra-ASEAN FDI flows. Singapore FDI flows from 2000 to 2008 total about 64.99%, whereas those from Malaysia are about 18.92%. The increase in strength of the intra-ASEAN flows could be partly explained by the increasing confidence of ASEAN investors in investing in their region and given shared geographical and cultural similarities. As ASEAN economies become more integrated and barriers to trade and investment come down, higher levels of intra-ASEAN flows may be expected.

The levels of FDI inflows to ASEAN have been different across industry. Table 3.5 presents FDI inflows by industry in ASEAN. For 2007, FDI flows to ASEAN continue to be concentrated in the services, accounting for 54.26% of flows, and

Table 3.4

FDI Inflows into ASEAN from ASEAN Countries (by Source), 2000-2008 (in US$ million)

Source Country	2000	2001	2002	2003	2004	2005	2006	2007	2008	2000-2008
Brunei	33.10	39.00	19.80	-6.40	17.50	26.10	-37.50	-1.60	54.40	144.40
Cambodia	2.40	1.00	1.30	5.50	4.10	0.30	-0.10	0.30	12.20	27.00
Indonesia	109.60	323.10	321.30	260.00	290.70	214.30	552.90	232.60	710.10	3,014.60
Lao PDR	9.80	0.10	0.00	0.00	0.00	-0.20	41.60	8.20	1.60	61.10
Malaysia	87.20	208.20	1,050.40	614.40	708.80	1,275.00	686.10	896.00	3,011.30	8,537.40
Myanmar	5.50	3.30	13.20	7.80	7.20	12.90	38.80	76.70	44.10	209.50
Philippines	92.10	34.00	22.60	-12.60	158.60	76.10	148.90	81.60	70.70	672.00
Singapore	640.70	1,982.40	2,045.50	1,683.50	1,593.40	2,576.70	5,921.70	7,230.80	5,875.20	29,549.90
Thailand	-225.00	-66.90	274.60	143.90	171.30	28.10	245.70	736.90	935.20	2,243.80
Viet Nam	6.30	2.20	64.30	5.90	7.00	8.30	4.20	147.20	356.00	601.40
Total	761.70	2,526.40	3,813.00	2,702.00	2,958.60	4,217.60	7,602.30	9,408.70	11,070.80	46,850.40

Adapted from: ASEAN Statistical Yearbook 2008, the ASEAN Secretariat

Table 3.5

FDI Inflows by Sector/industry in ASEAN, 2003–2007 (in US$ billion)

Sector/industry	2003	2004	2005	2006	2007[a]
Primary Sector	4,700.00	780.00	2,453.00	1,717.00	4,988.00
Agriculture, fisheries and forestry	185.00	223.00	187.00	341.00	2,672.00
Mining	4,514.00	558.00	2,266.00	1,376.00	2,316.00
Manufacturing Sector	6,782.00	14,138.00	17,137.00	16,147.00	20,116.00
Services Sector	10,613.00	17,507.00	15,966.00	28,913.00	32,175.00
Construction	91.00	-55.00	21.00	523.00	466.00
Trade and commerce	3,239.00	3,995.00	4,770.00	6,836.00	10,043.00
Financial intermediation and services	5,407.00	10,039.00	4,606.00	12,361.00	9,366.00
Real estate	812.00	1,106.00	2,432.00	4,154.00	6,094.00
Others	1,899.00	2,754.00	3,602.00	4,544.00	2,018.00

Adapted from: World Investment Report 2008, UNCTAD
a. Data are preliminary.

manufacturing sectors, accounting for 33.92% of FDI. Services has become increasingly important as a sector in ASEAN. The share of FDI inflows in the services sector has increased dramatically from US$ 10,613 million in 2003 to US$ 32,175 million in 2007. FDI inflows in the manufacturing sector were also increasing during this period, except in the year 2006. FDI inflows tripled in only four years from US$ 6,782 million in 2003 to US$ 20,116 million in 2007. After a huge drop in the year 2004, FDI inflows to the primary sector (comprising agriculture, mining and quarrying) have experienced a major resurgence in 2007. This is likely due to global price movements and perceived tight supply conditions from scarce and depleting resources, particularly in the mining sectors.

3.2 Policies Toward FDI

One of the primary goals of ASEAN is to be a center for global investment. The ASEAN Economic Community (AEC), as a result, was created at the Ninth ASEAN Summit in October 2003. The AEC works to establish ASEAN as a single market and production base that will make ASEAN more dynamic and competitive. Due to an awareness of the increasing interdependence of the region's economies, ASEAN has declared the objective of accelerating the ASEAN Economic Community goals by 2015. The free flow of investments is one of the five core elements of the AEC and also a key to enhance ASEAN competitiveness and attract both FDI and intra-ASEAN investment. The cooperation of the ASEAN nations to promote investment flow was implemented through the 1995 Framework Agreement on the ASEAN Investment Area (AIA). The goal of the AIA is to make ASEAN a competitive, conducive and liberal investment area through several measures as follows:

- implementing coordinated ASEAN investment cooperation, to include a coordinated promotion program and investment awareness activities
- immediate opening up of all industries for investment. Granting immediate national treatment to these industries with some exceptions, as specified in the Temporary Exclusion List (TEL) and the Sensitive List (SL)
- actively involving the private sector in the AIA development process
- promoting freer flows of capital, skilled labor, professional expertise and technology amongst the member countries
- providing transparency in investment policies, rules, procedures, administrative processes, establishing a more streamlined and simplified investment process
- eliminating investment barriers and liberalizing investment rules and policies in the sectors covered by the Agreement

These measures reflect the attempt of ASEAN to attract more FDI into the region by improving the region's investment environment and investment infrastructure.

Despite the fact that the AIA implies a mechanism for investment liberalization, it also represents a regional protectionism at the same time. According to Jarvis (2008), the AIA provides privileges to ASEAN investors over other foreign direct investors through the exemption specified in the Temporary Exclusion List (TEL), Sensitive List (SL), and the General Exception List. Due to these lists, there are some industries that are temporarily closed to investment that are not granted national treatment and some industries that cannot be opened for investment at all. Investment protectionism or sectoral sheltering, as a result, still persists in ASEAN. Another possible obstacle of

investment liberalization is the fragility of East Asian regionalism. Baldwin (2007) contends that there is no real regionalism in East Asian yet. The unilateral tariff-cutting in ASEAN is not binding to World Trade Organization (WTO) discipline to ensure the smoothing of bilateral trade. The tariff rate can be raised anytime by shocks to the system. This will reduce industrial competitiveness in East Asia, which may also affect the attractiveness of investment to the region. According to Yeyati et al. (2003), the effects of regionalism are important for intraregion FDI. The formation of regionalism that reduces trade barriers may discourage FDI among members in the case of horizontal and tariff-jumping FDI, but it may encourage vertical FDI through a reduction of transactions cost. Regarding FDI from home countries outside the region, the real regionalism implies a much larger size of the market. Responding to this larger opportunity may generate new FDI investment in activities that need to establish economies of scale. This will increase the attraction of the region for FDI. The fragility of East Asian regionalism, as a result, is an issue of concern to the ASEAN countries.

ASEAN has continued efforts to improve the investment environment by signing the ASEAN Comprehensive Investment Agreement (ACIA) in 2009, scheduled to enter into force at the end of 2009. This agreement covers liberalization, protection, facilitation and promotion and includes new provisions and improvements to AIA provisions. ASEAN members expect that the region will remain in the forefront as a major recipient of global FDI flows.

CHAPTER 4

ANALYSIS OF FDI DETERMINANTS: DATA AND METHODOLOGY

This chapter presents the data and methodology used to analyze the determinants of industry-level FDI in the five ASEAN countries. The chapter begins with a data sample description of the scope of the study with regard to the dependent variables, followed by the methodology used to describe the model and the explanatory variables.

4.1 Data

The FDI data used in this study are industry-level inward FDI (in million US$) from several home countries to the five host countries from ASEAN, which are Indonesia, Philippines, Malaysia, Thailand, and Vietnam. The home countries consist of two countries from ASEAN, which are Malaysia and Singapore; and seven countries outside ASEAN, which are China, Republic of Korea (ROK), Taiwan, Hong Kong, Japan, U.S., and the European Union or EU-15[2]. The industry-level inward FDI data are 2-digit ISIC Rev.3 data, which are obtained from the Statistics of FDI in ASEAN collected by the ASEAN Secretariat. The study focuses on 22 sectors of manufacturing industries, which are described in Table 4.1.

[2] European Union or EU (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom)

Table 4.1

Classification of Manufacturing Industries by ISIC Rev. 3

ISIC Rev.3	Industry Description	Abbreviation*
15	Food Products & Beverages	Food
16	Tobacco Products	Tobacco
17	Textiles	Textiles
18	Wearing apparel; dressing and dyeing of fur	Garments
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	Leather products
20	Wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	Wood & products
21	Paper and paper products	Paper & products
22	Publishing, printing and reproduction of recorded media	Printing
23	Coke, refined petroleum products and nuclear fuel	Refinery products
24	Chemicals and chemical products	Chemicals
25	Rubber and plastic products	Rubber
26	Other nonmetallic mineral products	Nonmetallic products
27	Basic metals	Basic Metals
28	Fabricated metal products, except machinery and equipment	Fabricated metal products
29	Machinery and equipment NEC (not elsewhere classified)	Machinery
30	Office, accounting and computing machinery	Computer

Table 4.1 Continued

ISIC Rev.3	Industry Description	Abbreviation*
31	Electrical machinery and apparatus NEC	Electronics
32	Radio, television and communication equipment and Apparatus	Communication
33	Medical, precision and optical instruments, watches and Clocks	Precision equipment
34	Motor vehicles, trailers and semi-trailers	Vehicles
35	Other transport equipment	Trans. Equipment
36	Furniture; manufacturing NEC	Furniture

Adapted from: ASEAN Database, ASEAN Secretariat.
*Abbreviation is set by the author.

For the dependent variable, the study uses cumulative FDI inflow over four years, i.e., 2000-2003, from one home country to one host country. The reason for using cumulative FDI is to reduce the year-to-year fluctuations of inward FDI data and to focus on cumulative inward FDI during these periods. The independent variables will be the values at the beginning of the period. The year 2000 is used as the base year. The reason the study uses the value of independent variables at the beginning of the period instead of a cumulative value like FDI is to avoid any lagging effect of those variables on FDI.

4.2 Analytical Framework

The framework for analysis is based on the Gravity Model and the OLI Paradigm. The analysis starts with a model with the traditional gravity equation and extends the gravity equation to ascertain if the Gravity Model concepts can explain the determinants of FDI in the five ASEAN countries. Next, two alternative models are also used to analyze the determinants of FDI to establish which is the better mode for explaining the FDI determinants. In the alternative modes, GDP per capita of the host country and that of the home country are used instead of the host country GDP. One model retains host and home country population data, whereas the other model rejects these two variables.

The traditional gravity equation follows Anderson's idea as following:

$$FDI_{ijk} = \alpha GDP_i^{\beta_1} GDP_j^{\beta_2} Pop_i^{\beta_3} Pop_j^{\beta_4} Dis_{ij}^{\beta_5}, \qquad (4.1)$$

where i, j, and k represent home country, host country, and the two-digit level of manufacturing industry, respectively. FDI_{ijk} is the inward foreign direct investment from home country i to host country j for the two-digit ISIC industry k. GDP_i is GDP of

home country i. GDP_j is GDP of host country j. Pop_i is population of home country i. Pop_j is population of host country j. Dis_{ij} is distance between home country i and host country j. For estimation purposes, the equation (4.1) is transformed into log-linear form expressed as follows:

$$lnFDI_{ijk} = \alpha + \beta_1 lnGDP_i + \beta_2 lnGDP_j + \beta_3 lnPop_i + \beta_4 lnPop_j + \beta_5 lnDis_{ij}. \quad (4.2)$$

Regarding the extended gravity equation, additional independent variables are added to the traditional equation. It can be expressed as follows:

$$\begin{aligned} lnFDI_{ijk} = {} & \alpha + \beta_1 lnGDP_i + \beta_2 lnGDP_j + \beta_3 lnPop_i + \beta_4 lnPop_j + \beta_5 lnDis_{ij} \\ & + \beta_6 lnIm_{ijk} + \beta_7 lnEx_{ijk} + \beta_8 lnTar_{jk} + \beta_9 lnOut_{jk} + \beta_{10} lnWage_{jk} \\ & + \beta_{11} lnEdu_j \end{aligned} \quad (4.3)$$

where Im_{ijk} is imports of industry k from home country i to host country j. Ex_{ijk} is exports of industry k from host country j to home country i. Tar_{jk} is host country j's tariff rate in industry k. Out_{jk} is host country j's output level of industry k. $Wage_{jk}$ is host country j's wage rate in industry k. Edu_j is host country j's education.

The last analysis is for the alternative models that use GDP per capita instead of using GDP as a mass of the Gravity Model for both host country and home country. These alternative models are analyzed in this section. One of the models, known as "alternative model 1" does not include the population of host and home countries,

whereas “alternative model 2” includes the population of host and home countries. The alternative model 1 is expressed as follows:

$$lnFDI_{ijk} = \alpha + \beta_1 lnCGDP_i + \beta_2 lnCGDP_j + \beta_3 lnDis_{ij} + \beta_4 lnIm_{ijk} + \beta_5 lnEx_{ijk} + \beta_6 lnTar_{jk} + \beta_7 lnOut_{jk} + \beta_8 lnWage_{jk} + \beta_9 lnEdu_j \quad (4.4)$$

where $CGDP_i$ is home country i' s GDP per capita and $CGDP_j$ is host country j’s GDP per capita. The expression for the alternative model 2 can be shown as follows:

$$lnFDI_{ijk} = \alpha + \beta_1 lnCGDP_i + \beta_2 lnCGDP_j + \beta_3 lnPop_i + \beta_4 lnPop_j + \beta_5 lnDis_{ij} + \beta_6 lnIm_{ijk} + \beta_7 lnEx_{ijk} + \beta_8 lnTar_{jk} + \beta_9 lnOut_{jk} + \beta_{10} lnWage_{jk} + \beta_{11} lnEdu_j \quad (4.5)$$

The independent variables can be divided into two groups, which are country-level variables and industry-level variables. The country-level variables include GDP, GDP per capita, population, distance, and education. The industry-level variables consist of imports, exports, wage, tariff, and level of output. Each independent variable is briefly explained as follows:

Host country’s GDP. This number reflects the size of the host market, which also represents the ownership-specific advantage variables of the host country. A bigger market implies bigger potential sales for the MNEs. Specifically, larger markets will attract more FDI to the country. From the Gravity Model point of view, this number represents mass in the host country. The sign is expected to be positive. GDP data are the

current value of GDP in year 2000, which are in billion US$. They are published in the World Development Indicators Database (the online version) of the World Bank.

Home country's GDP. This number reflects the ability of the home country to invest abroad. It is expected that a high-income country will have a higher level of outward FDI. From the Gravity Model point of view, this number represents mass in the home country. The data are published in the World Development Indicators Database of the World Bank. The sign is expected to be positive. They are measured in the current value of GDP in year 2000, which are in billion US$. The data are published in the World Development Indicators Database (the online version) by the World Bank.

Population. These data also measure country size. There is a negative relation between trade and population because large countries tend to be more self-sufficient. Population can have either a positive or negative impact on FDI inward depending on the type of FDI. Population is expected to have positive sign on FDI if trade and FDI are substitutes, i.e., horizontal FDI. Conversely, a negative sign is expected if they are complements, e.g., vertical FDI. From the Gravity Model point of view these data also represent mass in each country. If the gravity model can explain the determinant of FDI, the expected sign is positive. Population data are collected by the World Development Indicators Database (the online version) by the World Bank. They are measured in thousands of people.

Distance. This number reflects the transportation costs between countries, which represent one of the location-specific advantage variables. Higher levels of transportation costs will encourage a firm to supply foreign markets through FDI rather than export to those foreign markets. The effect of distance on FDI can be positive. The higher distance,

however, can often also imply more differences in culture, language, and institutions. High distance also restricts face-to-face communication and networking. Distance can also contribute to higher operating costs among countries, which may act as a barrier for home countries to invest in host countries. According to these issues, the expected sign for distance can be negative. The number for distance is determined as the distance measured in miles between the capitals of each host country and each home country. The U.S. is an exception in this case, since the west-coast city of Los Angeles is used instead of the U.S. capital, Washington D.C.. Distance data are calculated by the Internet website named timeanddate.com and is measured in miles.

Imports. This number can be one of the proxies for the degree of integration between the host and home country. The relation between imports and FDI can be either positive or negative depending on the types of FDI. In the case of vertical FDI, a higher degree of integration will facilitate FDI in the host country. The expected sign should be positive. In the case of substitutes, the expected sign would be negative. The number for import data represents the bilateral imports of the host country from the home country for each industry. The raw data of imports are categorized by Harmonized System 2002 (HS 2002). The HS-based-imports data are collected in World Trade Atlas software developed by Global Trade Information Services, Inc.[3] Data are measured in million US$.

Exports. This number is another proxy for the degree of integration between two countries. The exports of the host country can reflect whether it is used as a base of production in order to distribute product back to the home country. The expected sign is positive. The raw data of exports are categorized by Harmonized System 2002 (HS

[3] The details explaining how to get ISIC-based imports can be found in Appendix A (Data Collection).

2002). The HS-based-exports data are collected in World Trade Atlas software developed by Global Trade Information Services, Inc.[4] Data are measured in million US$.

Tariffs. This number reflects trade barriers and is considered one of the location-specific advantage variables. High tariff rates increase the costs of bilateral trade. If trade and FDI are substitutes, high tariffs may cause tariff-jumping FDI. Thus, it should have a positive sign. In contrast, if they are complements, the sign is expected to be negative. The tariff rate in this study is the average Most Favored Nation (MFN) applied tariff rate by industry of each host country. The raw data of tariffs are the HS-based tariff rate published in TRAINS (Trade Analysis and Information System) by UNCTAD, CD-ROM version.[5]

Output level. The level of output measures the size of industry. A large industry implies a large market size for that industry, which can be a proxy of rate of return for that industry. This also implies that there are abundant suppliers for that industry, which will facilitate the industry's production. This network will attract more FDI into that industry. The expected sign should be positive. The data of output levels are published in the Industrial Statistics Database 2007 by United Nations Industrial Development Organization (UNIDO), CD-ROM Version, 2001. They are measured in US$.

Wage. This number reflects the costs of workers in the host country. The study will use wage by industry to determine if different wages impact the FDI attraction by each industry differently. The sign of wage is expected to be negative. A proxy of wage is wage per worker, which is calculated by dividing the total wage of each industry by the number of employees in that industry. The total wage and the number of employees are

[4] The details explaining how to get ISIC-based exports can be found in Appendix A (Data Collection).
[5] The details explaining how to get ISIC-based tariff can be found in Appendix A (Data Collection).

published in the Industrial Statistics Database 2007 by United Nations Industrial Development Organization (UNIDO), CD-ROM Version. The unit of wage is US$.

Education. This variable reflects the quality of workers in the host country. A high quality of labor measure will be able to attract more FDI. Higher quality of labor, however, implies higher wage rates, which can cause a decrease in FDI. If the benefit of high-quality workers can outweigh the advantage of lower-cost workers, the higher quality of worker may attract more FDI. The expected sign of education, as a result, can be either negative or positive. The gross enrollment ratio of secondary school is used as a proxy of education. The gross enrollment ration is "the number of students enrolled in a level of education, regardless of age, as a percentage of the population of official school age for that level."[6] The data are published in the World Development Indicators Database by the World Bank and measured as a percentage of secondary age group.

Host country's GDP per capita. This number can measure the purchasing power of the host country markets, which is an alternative proxy of the host country's potential market size. A larger market size in the host country will attract more FDI to the country. The expected sign should be positive. GDP per capita is calculated by dividing GDP by the population and is measured in US$.

Home country's GDP per capita. This number serves as an alternative proxy of the home country's income instead of using the home country's GDP. This measure reflects the ability of home country to invest abroad. The sign is expected to be positive. GDP per capita is calculated by dividing GDP by the population and is measured in US$.

All three models employ dummy variables to reflect the difference of technology levels between industries. Twenty-two industries are divided into four groups according

[6] Human Development Report 1999, UNDP

to level: high technology, medium-high technology, medium-low technology, and low technology. The classification is from the OECD taxonomy based on the manufacturing industries' technological intensity. The summary of industry classification by technology level is presented in Table 4.2. DVH, DVMH, and DVML are dummy variables for the industry technology levels of high, medium-high, and medium-low, respectively.[7]

According to these models, the descriptions of the variables used in the estimations are presented in Table 4.3. The descriptive statistics and correlation matrix of the variables are shown in Table 4.4 and Table 4.5, respectively.

[7] DVL, which is a dummy variable for low technology industry, has been dropped to prevent perfect multicollinearity.

Table 4.2

Classification of Manufacturing Industries by Technology Level

ISIC Rev.3	Industry Description	Technology Level
15-16	Food Products, Beverages, and Tobacco	Low
17-19	Textiles, textile products, leather and footwear	Low
20-22	Wood, pulp, paper and paper products, printing and publishing	Low
36	Furniture; manufacturing NEC	Low
23	Coke, refined petroleum products and nuclear fuel	Medium-low
25	Rubber and plastic products	Medium-low
26	Other nonmetallic mineral products	Medium-low
27-28	Basic metals and fabricated metal products	Medium-low
24	Chemicals and chemical products	Medium-high
29	Machinery and equipment NEC (not elsewhere classified)	Medium-high
31	Electrical machinery and apparatus NEC	Medium-high
34	Motor vehicles, trailers and semi-trailers	Medium-high
30	Office, accounting and computing machinery	High
32	Radio, television and communication equipment and apparatus	High
33	Medical, precision and optical instruments, watches and clocks	High
35	Other transport equipment	High

Adapted from: Benchmark Definition of Foreign Direct Investment , OECD.

Table 4.3

Description of the Variables Used in the Estimations

Variable	Description
ln FDI	Natural logarithm of FDI (million US$)
ln sGDP	Natural logarithm of host country's GDP (billion US$)
ln mGDP	Natural logarithm of home country's GDP (billion US$)
ln sPop	Natural logarithm of host country's population (thousand people)
ln mPop	Natural logarithm of home country's population (thousand people)
ln Dis	Natural logarithm of distance between host country and home country (miles)
ln Imp	Natural logarithm of host country's imports (million US$) from home country for industry
ln Exp	Natural logarithm of host country's exports (million US$) from home country for industry
ln Wage	Natural logarithm of wage (US$) of industry
ln Tar	Natural logarithm of tariff rate of industry
ln Out	Natural logarithm of output level (US$) of industry
ln Edu	Natural logarithm of education of host country
ln sCGDP	Natural logarithm of host country's GDP per capita (US$)
ln mCGDP	Natural logarithm of home country's GDP per capita (US$)
DVH	Dummy variable for high technology industry
DVMH	Dummy variable for medium-high technology industry
DVML	Dummy variable for medium-low technology industry

Table 4.4

Descriptive Statistics

Variable	N	Mean	Minimum	Maximum	Std Dev
ln FDI	759	1.87952	-6.90776	8.22848	2.3706
ln sGDP	759	4.42303	3.43946	5.10607	0.58371
ln mGDP	759	6.78958	4.50336	9.18654	1.76914
ln sPop	759	11.20986	10.05508	12.23692	0.68906
ln mPop	759	11.06544	8.301	14.04872	1.78947
ln Dis	759	7.68631	5.23111	9.22661	0.90946
ln Imp	759	3.77399	-5.80382	8.88254	1.87585
ln Exp	757	3.55436	-10.8198	8.99812	2.42544
ln Wage	735	6.11882	-0.29249	9.44147	3.05978
ln Tar	759	2.31328	0.09531	5.99844	0.7539
ln Out	735	21.15673	14.95496	24.25024	1.30124
ln Edu	759	4.24269	4.04305	4.40672	0.12636
ln sCGDP	759	7.02869	5.99519	8.26379	0.77003
ln mCGDP	759	9.53964	6.85560	10.51296	1.08001
DVH	759	0.16469	0	1	0.37115
DVMH	759	0.2108	0	1	0.40815
DVML	759	0.23057	0	1	0.42147

Table 4.5

Correlation Matrix of the Variables

	ln FDI	ln sGDP	ln mGDP	ln sPop	ln mPop	ln Dis	ln Imp
ln FDI	1.00						
ln sGDP	0.00	1.00					
ln mGDP	0.18	0.01	1.00				
ln sPop	-0.13	0.28	-0.04	1.00			
ln mPop	0.03	-0.01	0.82	-0.01	1.00		
ln Dis	0.06	0.12	0.85	0.04	0.71	1.00	
ln Imp	0.38	0.14	0.25	-0.22	0.17	0.16	1.00
ln Exp	0.33	0.45	0.24	-0.09	0.07	0.19	0.47
ln Wage	-0.07	0.82	0.04	-0.20	0.01	0.10	0.24
ln Tar	0.10	-0.16	-0.02	-0.05	-0.02	-0.04	-0.33
ln Out	0.29	0.42	0.01	-0.14	0.01	0.06	0.33
ln Edu	-0.07	-0.16	0.02	-0.59	0.00	-0.05	0.15
ln sCGDP	0.11	0.51	0.05	-0.69	0.00	0.06	0.30
ln mCGDP	0.24	0.04	0.29	-0.06	-0.32	0.22	0.12

Table 4.5 Continued

	ln Exp	ln Wage	ln Tar	ln Out	ln Edu	ln sCGDP	ln mGDP
ln FDI							
ln sGDP							
ln mGDP							
ln sPop							
ln mPop							
ln Dis							
ln Imp							
ln Exp	1.00						
ln Wage	0.46	1.00					
ln Tar	-0.16	-0.26	1.00				
ln Out	0.48	0.44	0.05	1.00			
ln Edu	0.04	0.26	0.11	0.02	1.00		
ln sCGDP	0.43	0.79	-0.08	0.45	0.40	1.00	
ln mCGDP	0.29	0.06	0.00	0.00	0.03	0.08	1.00

Source: Author's calculation

CHAPTER 5

ANALYSIS OF FDI DETERMINANTS: EMPIRICAL RESULTS AND ANALYSIS

This chapter presents the empirical results and analysis of the models in Chapter 4. The first section discusses the results of all three models in Chapter 4. The answers to the FDI determinants are presented. The second section presents a comparison of the models.

5.1 The Results of FDI Determinant Analysis

This section presents and compares the results of all three models from regression analysis. The estimated results answer the determinants of FDI in five of the ASEAN countries.

Bringing all of the study variables together through the traditional gravity equation model, Table 5.1 summarizes the results of the model estimations. The intercept indicates a positive sign and is statistically significant at 1 percent. The coefficient of a host country's GDP (sGDP) shows a positive sign; however, it is statistically insignificant. So, this result does not have a properly explanatory power for the dependent variable. This is inconsistent with the Gravity Model's concept about mass when the GDP of the host country is considered as a mass.

Table 5.1

FDI Determinants Analysis: The Traditional Gravity Equation

(Dependent variable: ln FDI)

Variable	Estimated Coefficient	t-value	Std. Coefficient
Intercept	8.71550***	5.68	1.53571
ln sGDP	0.17437	1.19	0.14597
ln mGDP	0.91432***	8.51	0.10747
ln sPop	-0.33774***	-2.76	0.12229
ln mPop	-0.41377***	-5.31	0.07789
ln Dis	-0.77416***	-4.45	0.17381
DVH	0.44430*	1.89	0.23552
DVMH	0.89080***	4.11	0.21664
DVML	1.03644***	4.92	0.21063
Adjusted R-square	0.1303		
N	758		

Note: ***, ** and * indicate significance at 1, 5, and 10 percent level, respectively. Std. Coefficient means standardized coefficient.

The sign of home country's GDP (mGDP) is positive at the 1 percent level of significance. By considering the GDP of the home country as the mass and the ability to invest abroad, an increase in the home country's GDP causes an increase in FDI. The richer countries tend to invest more in the five ASEAN countries. With the regression model running in Log-Log form, the coefficient measures the elasticity of dependent variables with respect to each independent variable. Therefore, if the home country's GDP changes by 1 percent, FDI will be increased by 0.91 percent.

The signs for the population of both the host country (sPop) and the home country are negative at a 1 percent level of significance. These results contradict the explanation of mass in the Gravity Model, which expects signs to be positive for both the home country's population and the host country's population. With regard to that idea that large countries tend to be more self-sufficient, the negative signs for population imply that trade and FDI are complements for both the host country and the home country. According to Table 5.1, if a host country's population increases by 1 percent, FDI will decline by 0.34 percent. With a home country's population increase of 1 percent, FDI will drop 0.41 percent.

The next variable prediction is distance between the host country and the home country (Dis). The negative sign of its coefficient is shown at a significance level of 1 percent. This result is consistent with the Gravity Model. An increase in distance by 1 percent generates a decrease in FDI of 0.77 percent due to a distance-related barrier of investment such as communication, information, cultures, and operating costs.

Among the dummy variables for the difference of technology levels of the various industries, the low technology industry is considered a reference industry. The results

show that an industry with a higher technology level has a higher growth of FDI than the low technology industry. Namely, the coefficient of dummy variable for high technology industry (DVH) shows a positive sign of 0.44 at the 10 percent significance level. Furthermore, the dummy variables for medium-high technology industry (DVMH) and medium-low technology industry (DVML) have positively signed coefficients of 0.89 and 1.03 at the 1 percent significance level, respectively. This shows that the medium-low technology industry has a higher growth of FDI, over the low technology industry.

In Table 5.2, the results of the regression of the extended gravity equation are shown. Unlike the traditional model, the intercept is 9.83 at a 5 percent significance level with the extended Gravity Model. The coefficient of the host country's GDP (sGDP) becomes statistically significant at a 1 percent level. The positive sign shows that a host country's GDP increase of 1 percent will cause FDI to rise by 1.66 percent. The coefficients for home country's GDP (mGDP), home country's population (mPop), and distance (Dis) are the same as those in the previous model, but the effects are weaker in the extended Gravity Model. FDI will rise only by 0.65 percent as home country's GDP increases by 1 percent at a 1 percent level of significance. With a 1 percent increase in the host country's population, FDI will drop by 0.98 percent at a 1 percent level of significance. At a 1 percent level of significance, FDI will drop only 0.32 percent when home country's population increase by 1 percent. Finally, FDI will decrease by 0.63 percent with every distance increase of 1 percent at a 1 percent level of significance. The host country's population (sPop), the sign of the coefficient is the same as in the previous model, but the effect is stronger. With a 1 percent increase in host country's population, FDI will drop by 0.98 percent at a 1 percent level of significance.

Table 5.2

FDI Determinants Analysis: The Extended Gravity Equation

(Dependent variable: ln FDI)

Variable	Estimated Coefficient	t-value	Std. Coefficient
Intercept	9.83184**	2.04	4.82518
ln sGDP	1.65576***	3.97	0.41751
ln mGDP	0.64653***	6.46	0.10011
ln sPop	-0.98375***	-5.74	0.17153
ln mPop	-0.31512***	-4.56	0.06917
ln Dis	-0.63392***	-4.23	0.14991
ln Imp	0.27525***	5.32	0.05175
ln Exp	0.17360***	4.34	0.04003
ln Wage	-0.48772***	-6.04	0.08079
ln Tar	0.44789***	3.54	0.12667
ln Out	0.34862***	5.01	0.06961
ln Edu	-1.84135**	-2.12	0.86789
DVH	0.52827**	2.22	0.23807
DVMH	0.66633***	2.99	0.22280
DVML	1.08091***	5.54	0.19528
Adjusted R-square	0.3816		
N	732		

Note: ***, ** and * indicate significance at 1, 5, and 10 percent level, respectively. Std. Coefficient means standardized coefficient.

Next, an estimation of all variables added to the extended Gravity Model is described. To begin with, the result of the regression coefficient of industry imports (Imp) shows a positive sign at a 1 percent level of significance. If imports increase by 1 percent, FDI will increase by 0.28 percent. This indicates that FDI and trade are complementary. The next estimation result of the coefficient of industry exports (Exp) is positive and statistically significant at level of 1 percent. A 1 percent increase in industry exports would be associated with an increase in FDI by 0.17 percent. The results imply that the host country might serve as a base of production for exporting product back to the home country. The result of this is to attract more FDI into the host country. These two variables, i.e., imports and exports, can also represent bilateral trade between the host country and home country, which is also a proxy for degree of integration. The positive signs of both imports and exports also indicate that a higher degree of integration between the countries will attract more FDI inflows.

The result of the coefficient of industry tariff rates (Tar) shows a positive sign with a significance level of 1 percent. When tariff rates increase by 1 percent, FDI will increase by 0.45 percent. These results can be explained by the concept of tariff-jumping FDI. A higher tariff rate equates to a higher barrier for the home country to export products to the host country. In this situation, the home country will establish MNEs in the host country rather than pay the tariff and export product to the host country.

The next variable prediction is the industry output level (Out), which represents the size of industry. The positive signed coefficient of output level is significant at a 1 percent level. As the level of output increases by 1 percent, FDI will rise by 0.35 percent.

These results can imply that the home country prefers to invest abroad in a big industry rather than a small one.

The next two variables are wage (Wage) and education (Edu). The coefficient of industry wage is negative and statistically significant at a 1 percent level. A wage increase of 1 percent will cause a decrease in FDI of 0.49 percent. The higher wage reflects higher costs of labor, which discourages FDI. Regarding education, the sign of its coefficient is negative at a 5 percent level of significance. If education increases by 1 percent, FDI will drop by 1.84 percent. These results can be explained by the fact that higher education creates a higher quality of worker, which results in higher costs for that worker. This implies that the home countries in this study want to invest in the five ASEAN countries due to lower labor costs rather than their high quality of labor.

Finally, the dummy variables for industry technology levels used in this model are the same as those in the previous model. Like the previous model, the signs for all three dummy variables are positive and the medium-low technology industry has the strongest effect on FDI. The effects of high technology industry and medium-low technology industry on FDI, however, are a little bit stronger in this model. Specifically, the growth rate of FDI for the high technology industries is 0.53 higher than the low technology industries at a significance level of 5 percent, whereas the growth rate of FDI for medium-low industries is 1.08 higher than low technology industries at a significance level of 10 percent. As for medium-high technology industries, the growth rate of FDI is only 0.67 higher than low technology industries at a 1 percent level of significance.

In Table 5.3, the results of the regressions of two alternative models are presented. Beginning with the alternative model 1 (with the host country's population and the home

Table 5.3

FDI Determinants Analysis: The Alternative Models

(Dependent variable: ln FDI)

Variable	Alternative Model 1			Alternative Model 2		
	Estimated Coefficient	t-value	Std. Coefficient	Estimated Coefficient	t-value	Std. Coefficient
Intercept	9.83184**	2.04	4.82518	13.98870***	3.64	3.84403
ln sCGDP	1.65576***	3.97	0.41751	0.87344***	5.36	0.16292
ln mCGDP	0.64653***	6.46	0.10011	0.34230***	4.93	0.06944
ln sPop	0.67201**	2.06	0.32616			
ln mPop	0.33142***	4.11	0.08070			
ln Dis	-0.63392***	-4.23	0.14991	-0.10922	-1.37	0.07971
ln Imp	0.27525***	5.32	0.05175	0.32039***	6.26	0.05118
ln Exp	0.17360***	4.34	0.04003	0.21043***	5.34	0.03940
ln Wage	-0.48772***	-6.04	0.08079	-0.36307***	-8.69	0.04179
ln Tar	0.44789***	3.54	0.12667	0.56049***	4.70	0.11920
ln Out	0.34862***	5.01	0.06961	0.30622***	4.40	0.06965
ln Edu	-1.84135**	-2.12	0.86789	-2.78427***	-4.36	0.63886
DVH	0.52827***	2.22	0.23807	0.48227**	2.01	0.23975
DVMH	0.66633***	2.99	0.22280	0.58101***	2.59	0.22453
DVML	1.08091***	5.54	0.19528	1.03236***	5.23	0.19723
Adjusted R-square		0.3816			0.3669	
N		732			732	

Note: ***, ** and * indicate significance at 1, 5, and 10 percent level, respectively. Std. Coefficient means standardized coefficient.

country's population), the estimated coefficient of host country GDP per capita is positive at a 1 percent level of significance. An increase in the host country GDP per capita (sCGDP) of 1 percent will create an increase in FDI of 1.66 percent. The higher purchasing power in the host country will attract more FDI. The positive signed coefficient of the home country GDP per capita (mCGDP) is also significant at a 1 percent level. If the home country GDP per capita increases by 1 percent, investment abroad will increase by 0.65% due to a higher ability to invest. Regarding population, the results of the estimated coefficient are different from the previous two models because they are positive. With a 1 percent increase in the host country population, FDI rise by 0.67% at a 5 percent level of significance. At a 1 percent level of significance, FDI will increase by 0.33 percent when the home country population increases by 1 percent. The results of these two variables are consistent with the mass concept of the Gravity Model. For all other variables, including the dummy variables, the estimated coefficients and the intercept of the model are the same as those in the extended Gravity Model.

Referring to Table 5.3 for the alternative model 2 (without the host country population or the home country population), the intercept is 13.99 at a 1 percent level of significance. The coefficient of the host country GDP per capita (sCGDP) is positive and statistically significance at a 1 percent level. The higher GDP per capita in the host country will attract more FDI. If the host country GDP per capita rises by 1 percent, FDI will increase by 0.87 percent. The higher GDP per capita, which reflects higher incomes in the host country, translates to a bigger market for the product. This will create an incentive for the home country to invest in the host country increase the attraction for FDI inflows.

Furthermore, the estimated results show a positive coefficient for the home country GDP per capita (mCGDP) at a 1 percent level of significance. When the home country GDP per capita has an increase of 1 percent, then FDI will rise by 0.34 percent. This implies that a richer home country will tend to increase the level of investment abroad. The coefficient for the variable of distance (Dis), however, is no longer at a significant level. It does not have a properly explanatory power for the dependent variable.

Regarding the other variables, with the exception of the dummy variables, the results show the estimated signs to be the same as those in the extended Gravity Model, at a 1 percent level of significance. Four of these variables will have stronger effects on the dependent variables over those in the second model. Specifically, the coefficients for the variables representing imports, exports, tariff rates, and education are 0.32, 0.21, 0.56, and -2.78, respectively. For the variables of wages and output levels, the effects on the dependent variables are found to be weaker in this model. The coefficient of wage is only -0.36, whereas the coefficient for output levels is only 0.30.

Finally, the results for the dummy variables regarding industry technology levels are similar to the results of the first two models. Specifically, all three types have higher FDI growth rates than the low technology industry. The medium-low technology industry has the highest rate of growth of FDI with a 1.03 over the reference, at a 1 percent level of significance, whereas the high technology industry has the lowest growth rate of FDI with a 0.48 over the reference, at a 5 percent level of significance. The coefficient of the medium-high technology industry is 0.58, at a significance level of 1 percent. All the variables, however, have weaker effects on FDI than in the extended Gravity Model.

5.2 Comparison of the Models

The results of the traditional Gravity Model imply that the use of only the masses between the host and home country along with distance are not enough to explore the determinants of FDI. When additional independent variables are added to the extended models, these variables have the explanatory power to better understand the dependent variables (ln FDI). The effects of most variables on FDI, excluding the host country population and the home country population, are consistent with what has been expected. The coefficients for population for both host country and home country are not consistent with the mass concept of the Gravity Model because they are negative instead of positive. They are positive, however, in the alternative model 1 when the GDP of the host country and of home country are replaced by GDP per capita.

The alternative model 1 is also based on the concept of the extended gravity equation. The objective of the modification of the alternative model 1 is to explore the effects of mass on FDI separately, with population and purchasing power acting as a proxy. This differs from the extended model approach of including the two masses, population and GDP. Including both GDP and population in the model may generate the problem of multicolinearity. The results of the alternative model 1 are consistent with the gravity concept to a high degree. The coefficients of the masses become positive, as expected for the model, whereas the coefficient of distance is negative. This model tends to be the best model for employing the Gravity Model to explain FDI determinants.

The alternative model 2 shows another way to explore FDI determinations that is not based on the gravity model. The model uses only GDP per capita for the host country to measure potential market size and GDP per capita of the home country to measure the

ability to invest. They both have a positive impact on FDI, whereas distance no longer has an explanatory power for FDI. The results show that the gravity model is not the only way to analyze FDI determinants.

In general, all of the last three models provide similar results for the other variables, namely, there are positive impacts on FDI form higher imports, higher exports, higher tariff rates, and higher output. The effects of wage and education on FDI are negative. The results of the models for the dummy variables of industry technology levels are also similar to one another. The industries that have higher technology levels have higher growth rates of FDI over the low-technology industries. The medium-low technology industries have the highest effect, whereas the high technology industries have the lowest effect.[8]

[8] The last three models are tested for the Ramsey test. The results indicate that the nonlinear combinations of the estimated values can help explain the endogenous variable. This implies that there are other variables that can explain FDI.

CHAPTER 6

ANALYSIS OF FDI VOLATILITY

The objective of this chapter is an analysis of the volatility of FDI for the group of five ASEAN countries from three home countries, i.e., EU, Japan, and the US. The analysis focuses on the impact of the size of FDI by industry and on the variability of FDI. The objective of this analysis is not to find determinants of FDI volatility, but to examine the volatility trends of FDI for given sizes of FDI within an industry. The study expects that the estimated results will provide guidelines for the possible positions of FDI volatility for each industry. The first section discusses the data and methodology and the regression results are presented in the second section.

6.1 Data and Methodology

This chapter uses the regression method to estimate equations to reflect how FDI variability across five host countries over five years depends on the size of FDI inflow. The analysis of FDI variability is estimated separately for each home country. The analysis focuses only on three important sources of FDI in five ASEAN countries and three home countries, consisting of the EU, Japan, and the US. FDI variability, which is a dependent variable, is estimated by the coefficient of variation of FDI over five years and five host countries for each 2-digit ISIC industry. The data set that is used for computing a coefficient of variation for each 2-digit ISIC industry is the FDI in that industry from

one home country of interest (e.g., EU) to each of the five ASEAN countries from 1999 to 2003. The data set used for computing the coefficient of variation of FDI for each industry in the case of the EU, as an example, is FDI_{ijt}, where is FDI_{ijt} is the FDI from the home country i to the host country j in year t for that industry and i is EU.

The independent variable of choice is the size of FDI inflow for each industry, which represents the average size of FDI in that industry from one home country of interest to a host country for one year.

Data in Table 6.1 demonstrate the coefficients of variation and the average size of FDI for three cases. On average, FDI from Japan has the highest volatility, whereas FDI from EU has the lowest volatility. The patterns of industry volatility of FDI are different across the three sources. For the EU, ISIC 22 (Printing) has the lowest volatility and ISIC 35 (Trans. Equipment) has the highest volatility. For Japan, the volatility is highest in ISIC 25 (Rubber) and is lowest in ISIC 30 (Computer). For the case of the US, the sector with highest volatility is ISIC 36 (Furniture) whereas the lowest is ISIC 27 (Basic Metals). The scatter charts of the coefficients of variation for the cases of the EU, Japan, and the US are shown in Figure 6.1, Figure 6.2, and Figure 6.3, respectively.

Next, the methodology is discussed. The basic approach to discover a relation between the variability of FDI, which is the coefficient of variation of total FDI from one home country to the five ASEAN countries, and the size of FDI, is to find an equation that can match the scatter of the coefficient of variation. The relation between the volatility of FDI and the FDI level can be expressed as follows:

$$CV = f(AFDI), \tag{6.1}$$

Table 6.1

The Coefficient of Variation (CV) and the Average Size of FDI (AFDI) (in US$ million)

ISIC	European Union		Japan		The US	
	CV	AFDI	CV	AFDI	CV	AFDI
15	1.691484	42.28955	1.394786	18.94905	1.68705	13.692
16	1.225652	15	n.a.	n.a	1.191887	11.05667
17	1.527744	6.387619	1.150116	6.261875	2.136136	31.37125
18	2.918735	10.06556	1.334376	3.016667	1.782095	1.8044
19	1.187085	6.568182	2.862866	4.461818	1.258542	0.238
20	1.063601	1.778462	1.097732	4.006667	1.697743	0.78625
21	1.271909	5.116154	3.11228	36.07538	1.374635	3.067778
22	0.878056	14.53333	1.245303	1.585	1.043859	0.143667
23	1.431953	599.1244	1.386199	35.26429	1.614543	233.265
24	1.671427	54.47174	1.794205	88.68478	1.873604	35.13833
25	1.552249	22.00286	3.633336	163.9927	1.241552	12.73867
26	1.216851	10.2665	2.086742	52.511	1.722279	9.14
27	1.483355	5.605833	3.665021	40.1145	0.806685	2.296667
28	0.978648	5.865238	1.859406	30.56696	1.479125	4.293846
29	1.257387	10.94783	1.789993	49.31	2.097646	10.9225
30	0.774479	16.762	0.697739	25.30625	1.324803	5.523333
31	1.535848	11.99643	0.876134	25.4365	1.349605	10.34833
32	1.481254	133.646	1.07164	180.7886	1.293741	344.3167
33	1.699379	9.428182	0.998253	13.45444	2.176632	13.45143
34	2.040687	12.19455	2.279757	56.6795	1.050626	7.508889
35	3.807232	65.04938	1.108225	12.17429	2.194054	6.246667
36	1.396157	6.487222	1.406071	4.644762	3.003855	6.921765
Mean	1.549599	48.43577	1.75477	40.63262	1.609123	34.73964

Source: Author's calculation

European Union: Coefficient of Variation

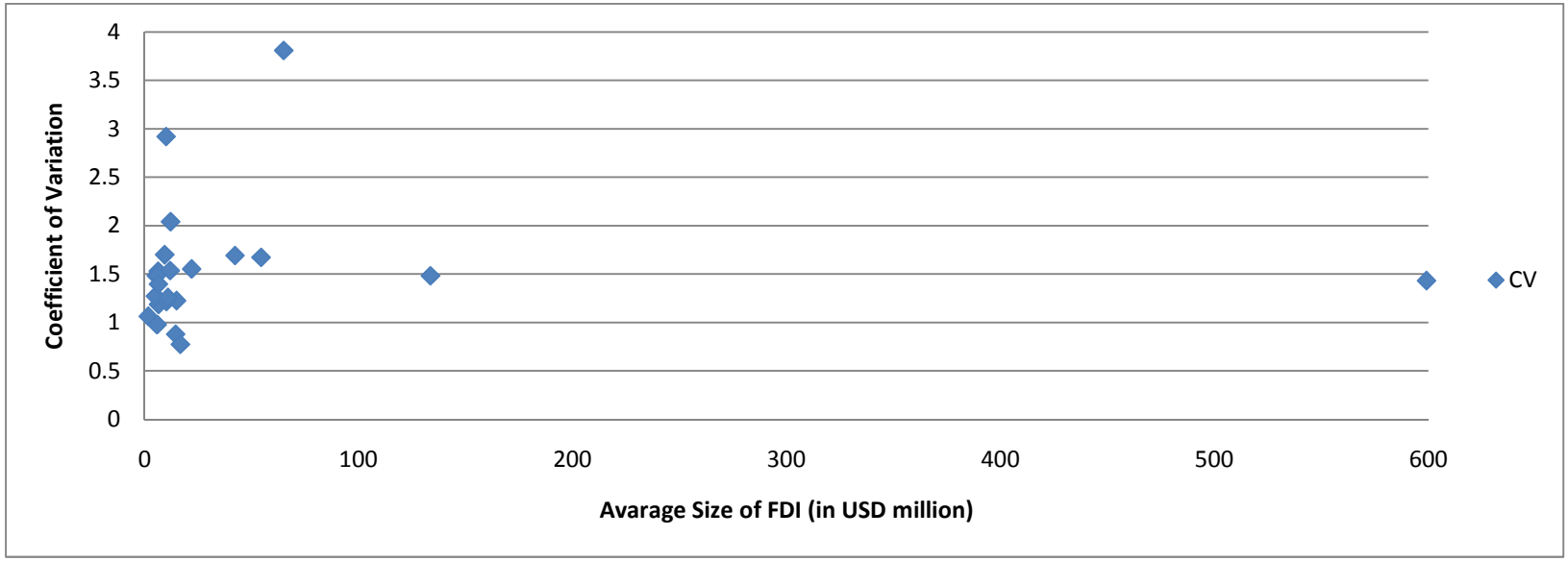


Figure 6.1 The Scatter Chart of the Coefficient of Variation and the Size of FDI from EU

Japan: Coefficient of Variation

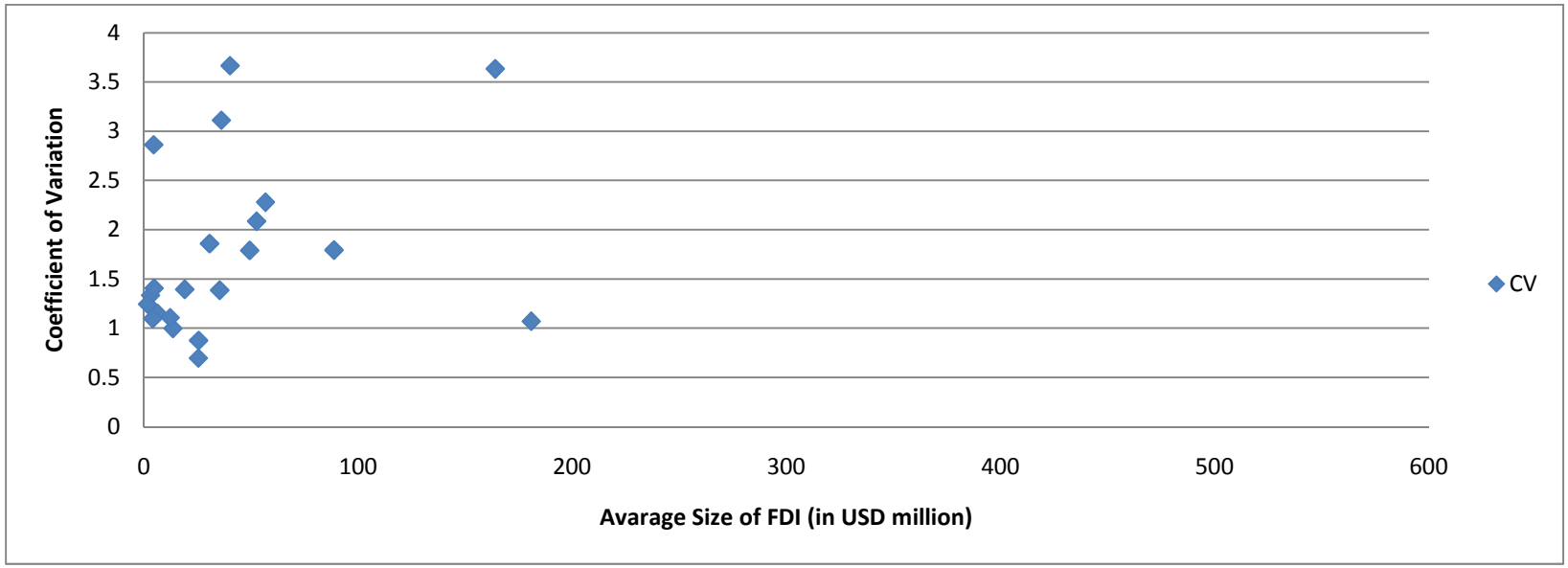


Figure 6.2 The Scatter Chart of the Coefficient of Variation and the Size of FDI from Japan

The US: Coefficient of Variation

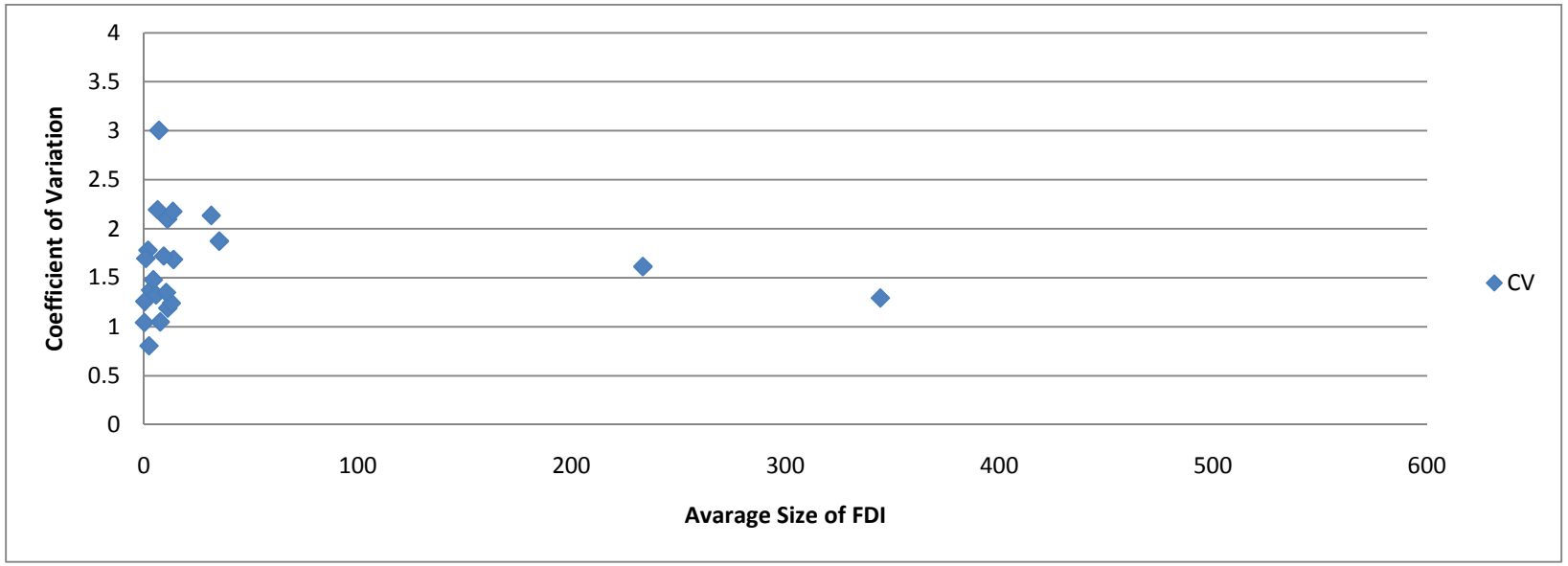


Figure 6.3 The Scatter Chart of the Coefficient of Variation and the Size of FDI from the US

where CV is the coefficient of FDI variation for each industry and AFDI is the average FDI per year and per host country. Two forms of the equation are used to estimate the relation between FDI variability and FDI level. One is a quadratic equation and the other is a polynomial equation of the third degree. (Linear form is also tested, but it does not fit the data. The results are not shown in the study.)

The quadratic equation and the polynomial equation of the third degree for estimating the effect of the size of FDI on FDI volatility for the case of the EU can be presented as follows:

$$CV_k = \alpha + \beta_1 AFDI_{EUk} + \beta_2 (AFDI_{EUk})^2 \quad (6.2)$$

$$CV_k = \alpha + \beta_1 AFDI_{EUk} + \beta_2 (AFDI_{EUk})^2 + \beta_3 (AFDI_{EUk})^3 \quad (6.3)$$

where CV_k is CV is the coefficient of FDI variation for industry k and $AFDI_{EUk}$ is the average FDI per year and per host country of the industry k from the EU to each host country in each year.

Next, the quadratic equation and polynomial equation of the third degree for estimating the effect of the size of FDI on FDI volatility for the case of Japan can be expressed as follows:

$$CV_k = \alpha + \beta_1 AFDI_{Japk} + \beta_2 (AFDI_{Japk})^2 \quad (6.4)$$

$$CV_k = \alpha + \beta_1 AFDI_{Japk} + \beta_2 (AFDI_{Japk})^2 + \beta_3 (AFDI_{Japk})^3 \quad (6.5)$$

where CV_k is CV is the coefficient of variation of FDI for industry k and $AFDI_{Japk}$ is the average FDI per year and per host country of the industry k from Japan to each host country in each year.

Finally, the quadratic equation and polynomial equation of the third degree for estimating the effect of the size of FDI on FDI volatility for the case of Japan can be expressed as follows:

$$CV_k = \alpha + \beta_1 AFDI_{USk} + \beta_2 (AFDI_{USk})^2 \quad (6.6)$$

$$CV_k = \alpha + \beta_1 AFDI_{USk} + \beta_2 (AFDI_{USk})^2 + \beta_3 (AFDI_{USk})^3 \quad (6.7)$$

where CV_k is CV is the coefficient of FDI variation for industry k and $AFDI_{USk}$ is the average FDI per year and per host country of the industry k from the US to each host country in each year.

For each home country, the regression method will be used to estimate the coefficients. The results will show which type of equation is better for explaining the relation between FDI volatility and the size of FDI.

6.2 Results of Model Specification

This section discusses the results from the regression analysis of FDI volatility for each home country, including the EU, Japan, and the US. Both equation forms are compared to see which best explains the variability of FDI.

The regression analysis for the EU is expressed in Table 6.2. The results of a regression for a quadratic form indicate that only the intercept is statistically significant at a 1 percent level, but none of coefficient of AFDI terms is significant, namely, the levels

Table 6.2

The FDI Volatility Analysis: FDI from EU

Variable	Estimated Coefficient	t-value	Std. Coefficient	P-value
Quadratic Equation				
Intercept	1.370703***	7.275856	0.188391	6.66E-07
AFDI	0.009313	1.536537	0.006061	0.140893
$AFDI^2$	-1.5E-05	-1.53617	1E-05	0.140982
N = 22				
Adjusted R Square = 0.0179				
Polynomial Equation of 3rd Degree				
Intercept	1.066434***	4.438556	0.240266	0.000317
AFDI	0.038837**	2.317638	0.016757	0.032447
$AFDI^2$	-0.00031*	-1.96715	0.000159	0.064774
$AFDI^3$	4.16E-07*	1.873431	2.22E-07	0.07734
N = 22				
Adjusted R Square = 0.13252				
Quadratic Equation (Without the Outlier)				
Intercept	1.079599***	4.692473	0.23007	0.000181
AFDI	0.036448**	2.437354	0.014954	0.025398
$AFDI^2$	-0.00024**	-2.08668	0.000116	0.051413
N = 21				
Adjusted R Square = 0.1850				

Note: ***, ** and * indicate significance at 1, 5, and 10 percent level, respectively. Std. Coefficient means standardized coefficient

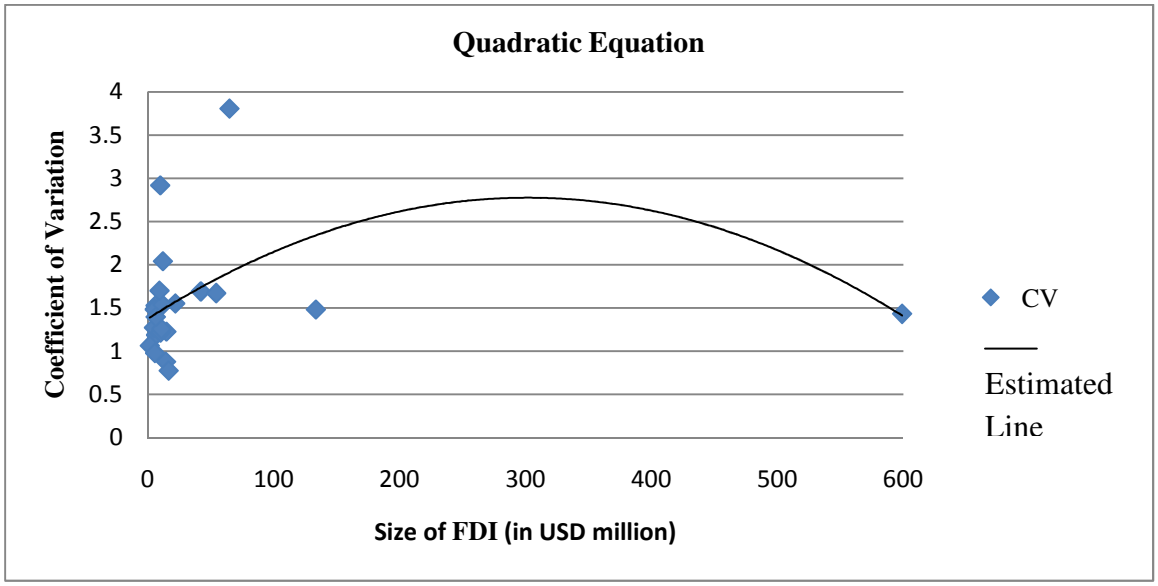
of significance for $AFDI^2$ and $AFDI^3$ are only 14 percent. The result of the polynomial equation of the third degree is an intercept of 1.06 that is statistically significant at a 1 percent level. The coefficient of AFDI is 0.0388 at a 5 percent level of significance. The coefficients of $AFDI^2$ and $AFDI^3$ are -0.0002 and 4.15907E-07, respectively that is at a 10 percent level of significance. Figure 6.4 shows the estimated lines derived from the regression method. Based on the regression results, the polynomial equation of the third degree seems to explain FDI volatility for the case of the EU. According to Figure 6.4, the estimated line for the polynomial equation of the third degree, however, is not valid because the coefficient of volatility cannot be negative. The major problem of insignificant results for the quadratic equation and invalid results for the polynomial equation of the third degree is the outlier with an FDI size of US$ 599 million.

The model for the EU is estimated again after deleting the outlier, which is ISIC 23 (Refinery Products) and the results presented in Table 6.2.[9] The results improve significantly with the removal of the outlier. Specifically, the intercept is positive and statistically significant at 1 percent level. The coefficient of AFDI is 0.0364, whereas that of the $AFDI^2$ is -0.0002. Both are statistically significant at a 5 percent level. This model better explains the FDI variability for the case of the EU. The estimated equation can be expressed as follows:

$$CV = 1.0796 + 0.0364AFDI - 0.0002\ AFDI^2. \qquad (6.8)$$

[9] The polynomial equation of the third degree is also tested after deleting the outlier. The results are not shown in the study because the result is worse than the quadratic equation. Also, the quadratic equation adequately explains the FDI variability.

EU: Estimated Coefficient of Variation



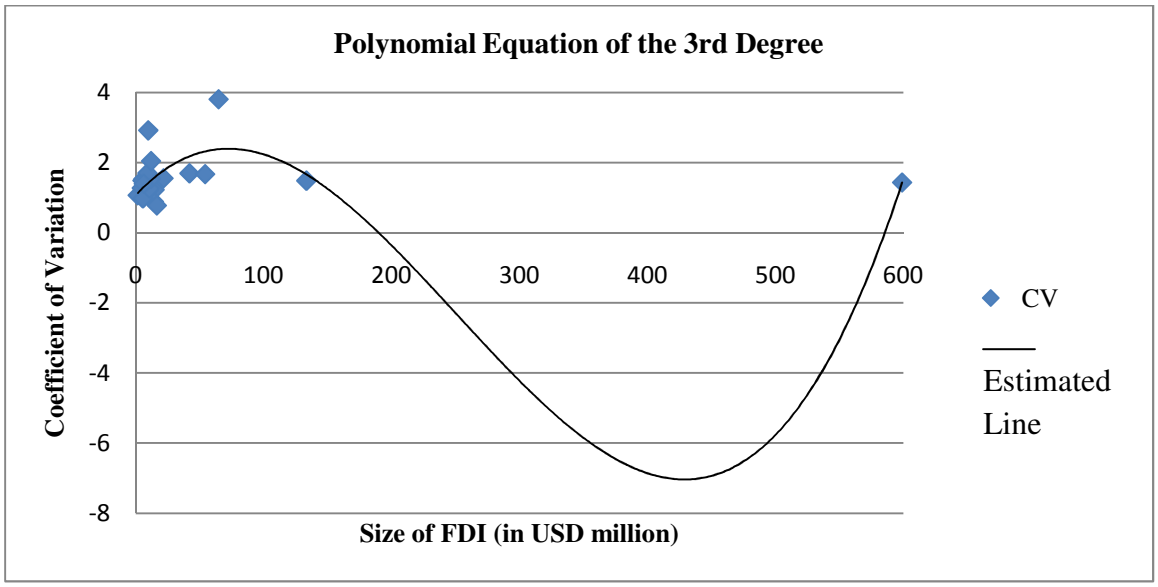


Figure 6.4 The Estimated Line for the Quadratic Equation and the Polynomial Equation of the Third Degree for EU

Representing the estimated line for the quadratic equation without the outlier, Figure 6.5 implies that the volatility of FDI from the EU increases with the size of FDI, and then decreases once FDI reaches a certain size. Concluding that the volatility of FDI from the EU will keep decreasing as the size goes bigger, however, is incorrect. If the omitted outlier is considered together with the result of equation 6.8, another conclusion can be implied. Namely, that the volatility of FDI will increase and then decrease as the size of FDI grows, but will converge to certain level of volatility at some point.

Next, the results of regression analysis for the case of Japan are demonstrated in Table 6.3. The results show that the quadratic equation better explains the relation between the coefficient of variation of FDI and the size of FDI, rather than the polynomial equation of the third degree. For the polynomial equation of the third degree, only the intercept is significant at a 1 percent level. As for the quadratic equation, the intercept is 1.209 with a significance level of 1 percent. The coefficient of AFDI is positive with a 10 percent level of significance. Even though the coefficient of $AFDI^2$ is not significant, its 18 percent level of significance is still more useful than the results of the polynomial equation of the third degree. As a result, the estimated quadratic equation is used to explain the volatility of FDI for the case of Japan. The estimated quadratic equation can be expressed as follows:

$$CV = 1.2088 + 0.0236AFDI - 0.0001\ AFDI^2. \qquad (6.9)$$

The estimated curves can be expressed as Figure 6.6. The shape of the curves for both the estimated quadratic equation and the polynomial equation of the third degree are similar. Note that as the FDI volatility increases, and then drops when the size of FDI increases.

EU: Estimated Coefficient of Variation

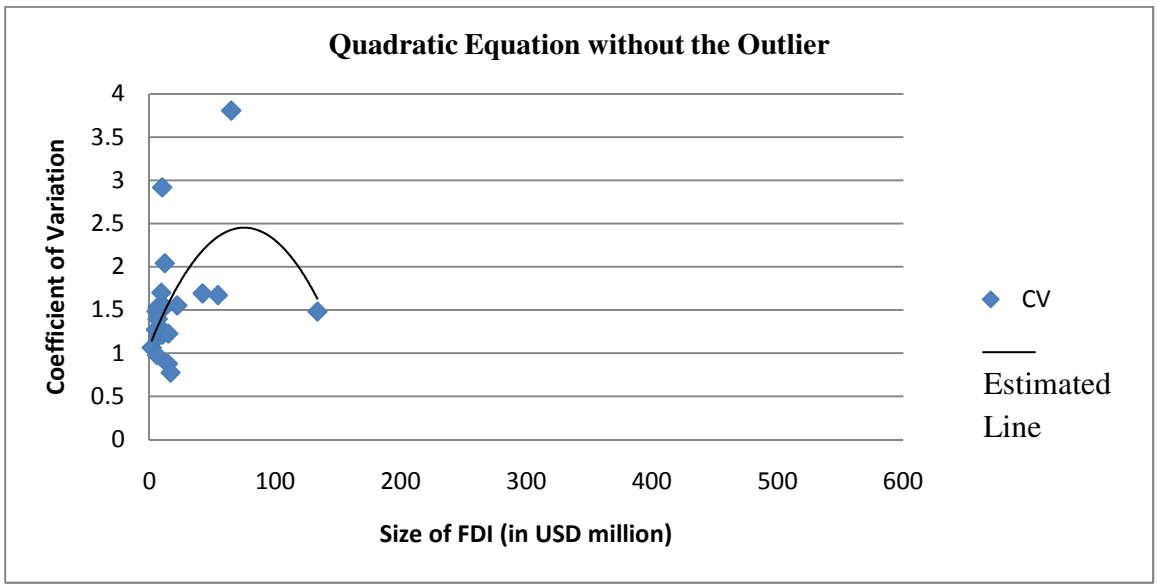


Figure 6.5 The Estimated Line for the Quadratic Equation Without the Outlier for EU

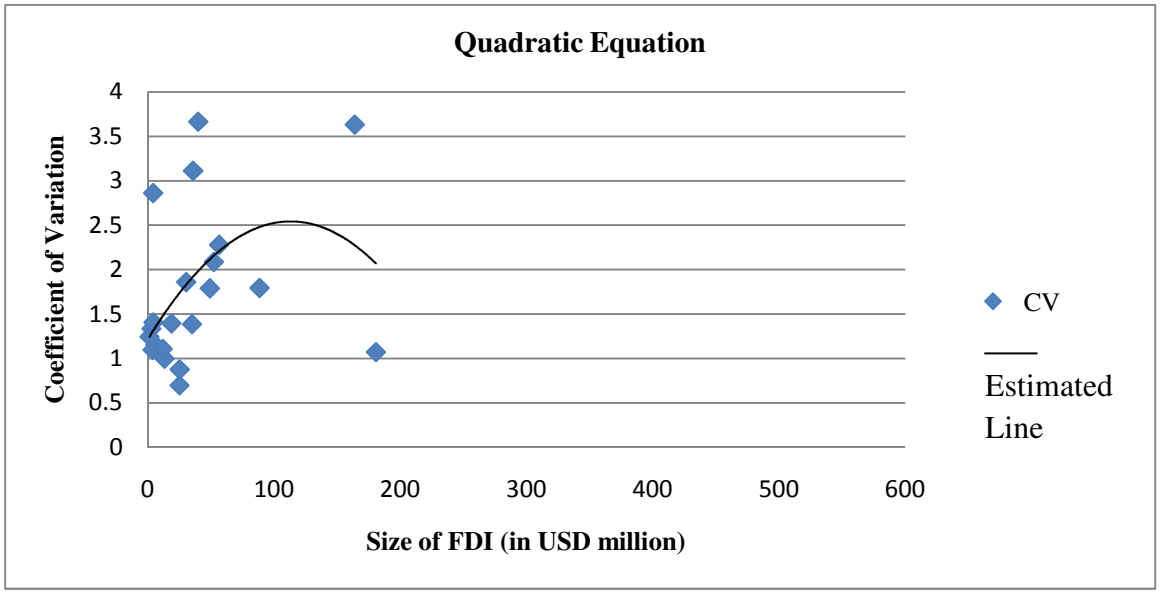
Table 6.3

The FDI Volatility Analysis: FDI from Japan

Variable	Estimated Coefficient	t-value	Std. Coefficient	P-value
Quadratic Equation				
Intercept	1.208808***	3.649852	0.331194	0.001832
AFDI	0.023555*	1.749657	0.013462	0.097206
$AFDI^2$	-0.0001	-1.38623	7.5E-05	0.182609
N = 21				
Adjusted R Square = 0.0957				
Polynomial Equation of 3rd Degree				
Intercept	1.406695***	3.564591	0.39463	0.002385
AFDI	-0.00067	-0.02289	0.029332	0.982006
$AFDI^2$	0.000381	0.723423	0.000526	0.479257
$AFDI^3$	-2E-06	-0.93057	2.18E-06	0.365103
N = 21				
Adjusted R Square = 0.0889				

Note: ***, ** and * indicate significance at 1, 5, and 10 percent level, respectively. Std. Coefficient means standardized coefficient

Japan: Estimated Coefficient of Variation



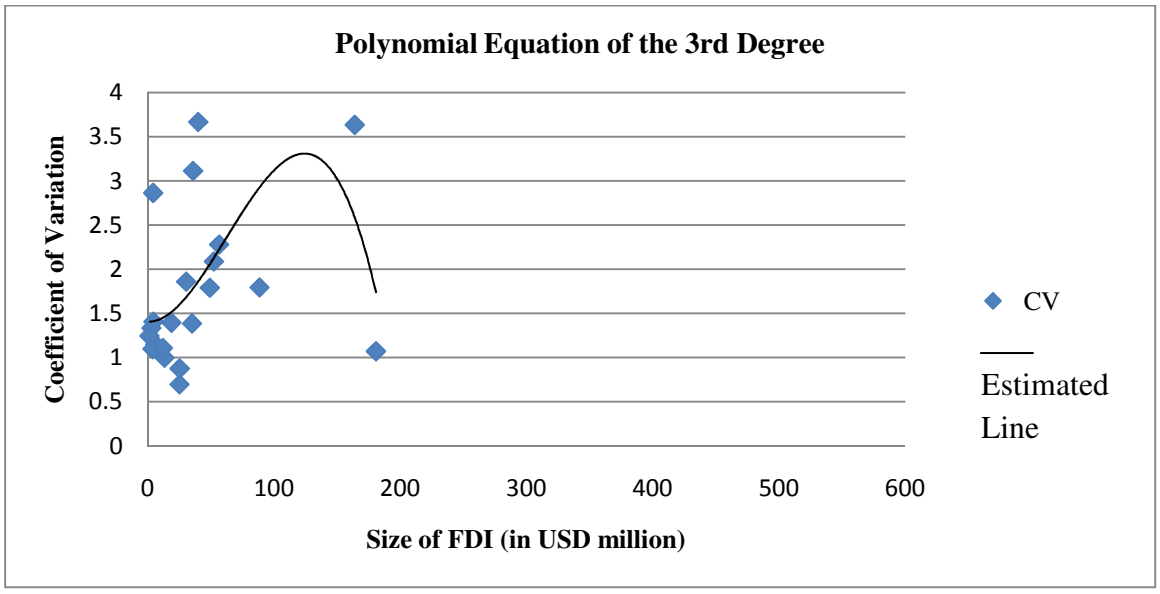


Figure 6.6 The Estimated Line for the Quadratic Equation and the Polynomial Equation of the Third Degree for Japan

The last estimation is for the US and the results of regression are presented in Table 6.4. All the coefficients of the independent variables are not significant in both models but their intercepts are significant at level of 1 percent. The estimated results of the polynomial equation of the third degree have a better level of significance. As a result, the estimated polynomial equation of the third degree is selected and can be expressed as follows:[10]

$$CV = 1.4240 + 0.0243FDI - 0.0002\ AFDI^2 + 2.63^{-7}AFDI^3. \qquad (6.10)$$

Figure 6.7 presents the estimated lines derived from the regression for both models. They both imply that the volatility of FDI increases first with the size of FDI and then starts to drop when the size of FDI increases. FDI volatility, however, rises again when the size of FDI is significantly large.

[10] The quadratic equation without outlier and the polynomial equation of the third degree without outlier are also estimated. The results, however, are not better than the polynomial equation with full data set. As a result, the estimated results are not shown in the study.

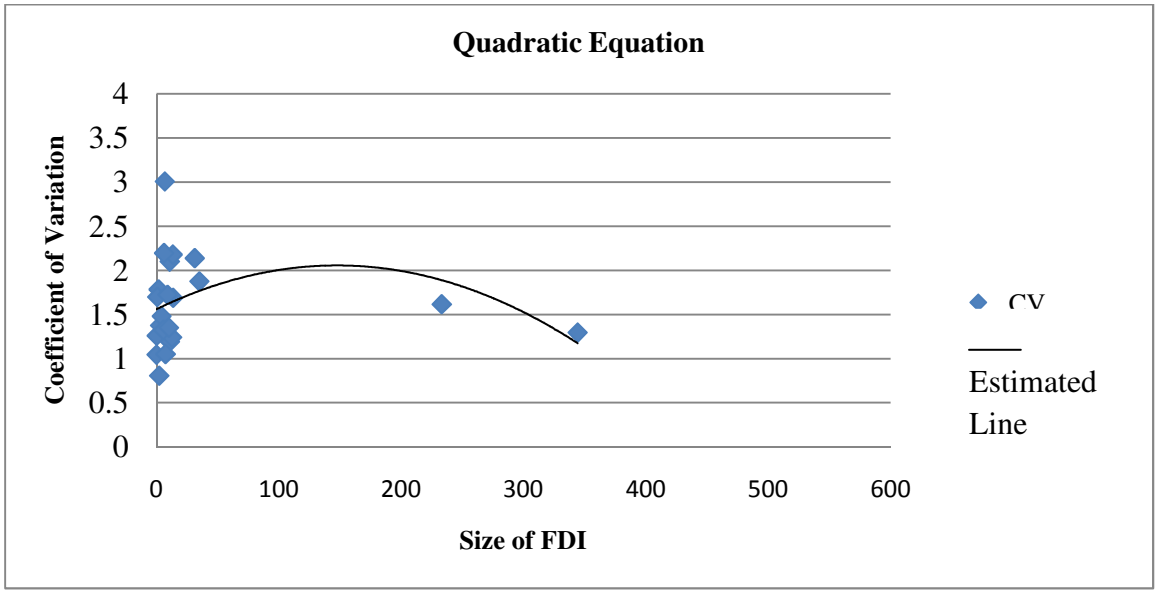
Table 6.4

The FDI Volatility Analysis: FDI from the US

Variable	Estimated Coefficient	t-value	Std. Coefficient	P-value
Quadratic Equation				
Intercept	1.558012***	11.57836	0.134562	4.73E-10
AFDI	0.006732	0.967554	0.006958	0.345423
$AFDI^2$	-2.3E-05	-1.05751	2.16E-05	0.303541
N = 22				
Adjusted R Square = -0.0366				
Polynomial Equation of 3rd Degree				
Intercept	1.424039***	8.30582	0.171451	1.43E-07
AFDI	0.024346	1.537799	0.015832	0.141491
$AFDI^2$	-0.00016	-1.41152	0.000115	0.175144
$AFDI^3$	2.63E-07	1.234645	2.13E-07	0.232838
N = 22				
Adjusted R Square = -0.0088				
Quadratic Equation (Without the Outlier)				
Intercept	1.434546***	8.556882	0.167648	9.28E-08
AFDI	0.022035	1.5298	0.014404	0.143451
$AFDI^2$	-9.1E-05	-1.50857	6.05E-05	0.148761
N = 21				
Adjusted R Square = -0.0209				

Note: ***, ** and * indicate significance at 1, 5, and 10 percent level, respectively. Std. Coefficient means standardized coefficient

The US: Estimated Coefficient of Variation



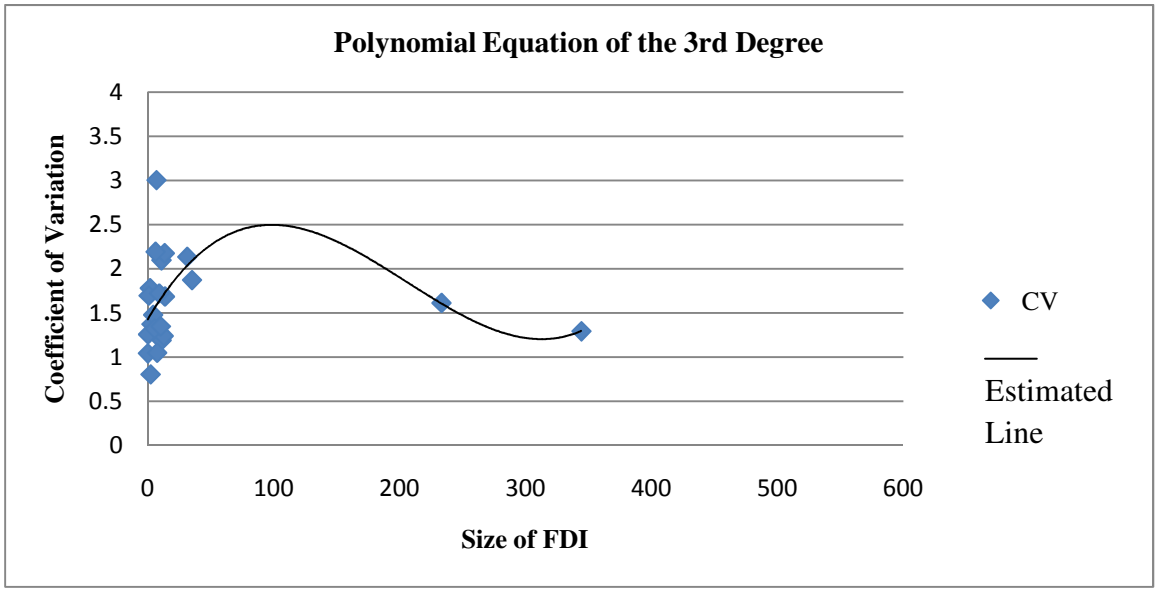


Figure 6.7 The Estimated Line for the Quadratic Equation and the Polynomial Equation of the Third Degree for the US

CHAPTER 7

CONCLUSIONS AND POLICY IMPLICATIONS

The objective of this study is to analyze FDI determinants, at both the country level and the industry level, for five ASEAN countries (Indonesia, Philippines, Malaysia, Thailand, and Vietnam). The study uses the cumulative FDI data from 2000 to 2003 by industry in five ASEAN countries. Another objective of the study is to explore the volatility of FDI from three major home countries (the EU, Japan, and the US) to find a relationship between the average size of FDI by industry and the volatility of FDI. A number of helpful conclusions can be drawn at this point along with some policy implications and recommendations, which are presented in this chapter.

7.1 Conclusions

There are many factors that impact the FDI position in a host country. A host country with a bigger market size, as measured by the host country's GDP or GDP per capita, will attract more FDI since the bigger market size implies that MNEs can sell more products and make a profit. Lower wage rates in an industry will attract more FDI into the industry, whereas higher education discourages FDI. This implies that MNEs in this region tend to value labor with low costs rather than high-quality labor. Trade integration between the host country and the home country, using imports and exports as proxies, has a positive impact on FDI. The industry that has a high volume of bilateral

trade with the home country will be able to attract more FDI. This implies that trade can facilitate industry FDI. Higher tariff rates in an industry will attract more FDI, especially for tariff-jumping FDI. The output level of an industry also has a positive impact on FDI. The higher industry's rate of return and an abundance of suppliers in industry will encourage the home country to invest in that industry. Distance has a negative effect on FDI because it increases costs of communication, institution, and operation to MNEs. The study also finds that richer countries will invest more in these host countries.

Regarding population variables, the results are not consistent with the gravity concept. In the first two models, when GDP variables and population variables are used as proxies for masses between two countries, the signs of coefficients of population variables are negative. These results should be positive. When the extended gravity equation, however, is modified by using only population variables as masses (dropping GDP variables) in the alternative model 1, the results show that with a given GDP per capita in the host and home counties, a higher population in the host and home countries will attract more FDI. These positive results are consistent with the gravity equation.

In general, the gravity equation can explain FDI determinants very well when only one proxy for masses between two countries is used. The gravity model, furthermore, is not the only way to explore FDI determinants. This last conclusion is supported by the results in the alternative model 2.

In the analysis of FDI, the study finds different relations between the size of FDI in an industry and the volatility of FDI among three cases. The study finds that relations between the size of FDI and the volatility of FDI are in quadratic form in the case of the EU and Japan. The volatility of FDI will increase when the size of FDI of an industry is

bigger until a certain level is attained. Then FDI will drop, as the size gets even bigger. As for the case of the US, the relation is in polynomial of the third degree form. With the bigger size of FDI, the volatility will go up, and then go down, and finally go up again.

7.2 Policy Implications

Based on the study results of FDI determinants, a number of specific policy implications and recommendation can be targeted for consideration by governments of these countries. According to the results that a high volume of bilateral trade can attract more FDI, government should promote bilateral trade agreements with other countries in order to facilitate FDI production through the free flow of goods and services. The bilateral trade agreement should be real and effective. The export-oriented industry should be promoted with product distribution as the important objective for investors.

The government should also reduce the information and transaction costs to attract more FDI. Any policies that will increase national income and productivity are also important as market size and purchasing power have a positive impact on FDI. The government should also encourage industrial growth and increase the number of local suppliers. According to results of wage analysis, the government should ensure that labor wage remain competitive, especially for an industry that has a high potential to attract FDI. In general, the results of industry-level independence variables give government a guideline to manage and reallocate resources among industries.

Based on the study results of FDI volatility and the assumption that these results are valid, the results can provide guidelines about the position of each industry and its FDI volatility. This can help the government to be careful when it wants to implement any policies that might impact the size of FDI in an industry. If the size of FDI in an

industry is on the downturn, any policies or shocks that might cause FDI to be smaller can also cause the volatility of FDI in that industry to go up.

7.3 Suggestions for Further Study

To expand the understanding of FDI determinants, researchers should consider including more independent variables in the models such as political risk, business facilities, investment climate, regional integration, and natural resources. Researchers should find another proxy for transaction costs. Researchers can also expand their industry-level analysis to host and home countries in different regions such as Latin American countries and African countries to explore the competition among ASEAN countries and countries in other regions. Instead of focusing on the level of FDI inflows for each host country, researchers should focus on the share of FDI inflows for each host country to explore the factors that may impact the share of FDI in each host country.

To expand the understanding of FDI volatility, researchers can study the determinants of FDI volatility to obtain a better understanding of the causes of FDI volatility. At that point, government can create better policy implements to reduce the volatility of FDI. There are many aspects to measure the volatility of FDI that have not been adequately explored, such as the volatility over time and the volatility between countries. Researchers should try another set of data that have a longer time frame to better analyze FDI volatility.

APPENDIX A

HOW TO CONVERT DATA FROM HS 2002 TO ISIC REV.3

A.1 Export and Import

The export and import data from the World Trade Atlas are classified according to 6-digit Harmonized System 2002 (HS 2002), whereas FDI inward data are classified according to 2-digit International Standard Industrial Classification Revision 3 (ISIC Rev.3). So, trade data must be converted from HS 2002 code to ISIC Rev.3 code. The Harmonized System is a commodity classification system. Articles are grouped largely according to the nature of the materials of which they are made. As for the International Standard Industrial Classification, it classifies data according to the kind of economic activity in the fields of production, employment, gross domestic product and other statistical areas. Data in HS 2002 cannot be converted directly into ISIC Rev.3 classification. The Central Product Classification version 1.0 (CPC Ver.1.0) and HS 1996 must be used to convert data from HS 2002 to ISIC Rev.3. The Central Product Classification is a classification based on the physical characteristics of goods or on the nature of the services rendered.

Figure A.1 illustrates how to convert data from HS 2002 to ISIC Rev.3 though HS 1996 and CPC Ver.1.0. There are three correspondences that are necessary for converting data from HS 2002 to ISIC Rev.3, which are 1) correspondence between ISIC Rev.3 and CPC Ver.1.0, 2) that between CPC Ver.1.0 and HS 1996, and 3) that between HS 1996 and HS 2002. Each correspondence is available on United Nations Statistics Division's website: http://unstats.un.org/unsd/cr/registry/regot.asp. Basically, it is necessary to find HS 2002 codes for each ISIC Rev.3 code. There are four steps for finding all HS 2002 codes for one ISIC Rev.3. First, for each ISIC Rev.3 code, use the correspondence between ISIC Rev.3 and CPC Ver.1.0 to get all CPC Ver. Codes that are

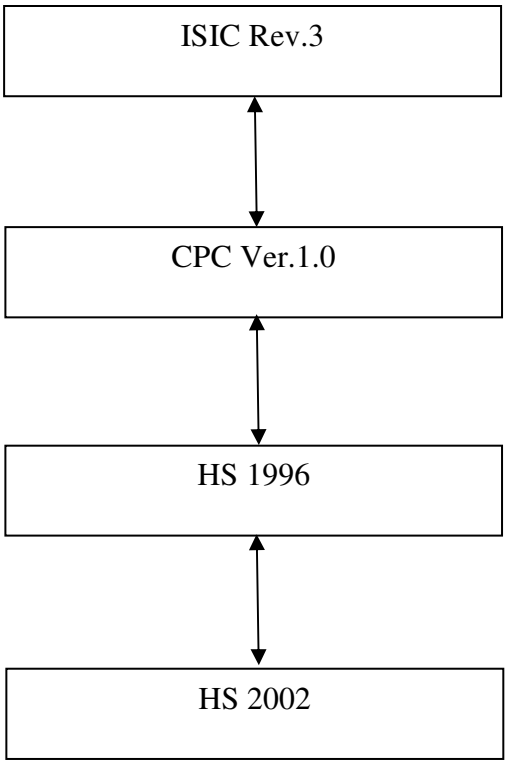


Figure A.1 How to Convert Data from HS 2002 Data to ISIC Rev.3

correspondent with that ISIC Rev.3. Second, match all CPC Ver.1.0 codes obtained from the first step with HS 1996 codes by using correspondence between CPC Ver.1.0 and HS 1996. Third, match all HS 1996 codes obtained from the second step with HS 2002 by using correspondence between HS 1996 and HS 2002. Finally, collect all HS 2002 codes for each ISIC Rev.3 code.

All HS 2002 codes, however, cannot just be summed up to get trade data for one ISIC Rev.3 code after finish these four steps because some ISIC Rev.3 may consist of the same HS 2002 code. As a result, it is necessary to finish these four steps for all ISIC Rev.3 codes and check whether each HS 2002 code appears in only ISIC Rev.3 code. For each HS 2002 code that appears in several ISIC Rev.3 codes, there is no theoretical method to divide it into several ISIC Rev.3 codes. As a result, each of them will be divided equally for all ISIC Rev.3 codes that contain it. Then, sum all HS 2002 codes for each ISIC Rev.3 code to get trade data.

A.2 Tariff Rate

Tariff data in TRAINS are classified to 6-digit Harmonized System 1996. To get tariff for each ISIC industry, select all 6-digit HS items that are in that 2-digit ISIC industry, according to method presented in previous part, the program will calculate the average tariff rate of all items selected. The maximum number of items that can be selected, however, is only 200 items; but each industry contains more than 200 items. The average tariff rate of each industry can be calculated by a weighted average of average tariff of each set of 200 items by total import of each set of 200 items.

APPENDIX B

DATA SHEET

The raw data used in this study are collected in the CD-ROM attached with this dissertation. Data contained in CD-Rom are the following:

Page

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