Impact of Foreign Direct Investment on Thailand's Trade and Domestic Private Investment

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ABSTRACT

Foreign investment not only brings along the direct benefits to the host country in the form of technological progress, but it also stimulates domestic activities through the linkage effects. This study investigates the impact of foreign direct investment (FDI) on Thailand's imports, exports, and domestic private investment, covering the period 1965 to 1997. By using the method of autoregressive distributed lag (ARDL) that minimises the possibility of estimating spurious relations while retaining long-run relationship information, the empirical results indicate that FDI does have significant effects on imports and domestic private investment, but not on exports. The vector error correction model (VECM) analysis, variant of the vector autoregression (VAR) analysis, is applied to investigate the inter-relation between trade (imports and exports), domestic private investment, and FDI. Through the impulse response approach, the results show that an increase in one variable does have an impact on others. On average, the impact will last for eight years. The empirical results from forecast error variance decomposition analysis also indicate that imports, exports, domestic private investment, and foreign direct investments have inter-relations between themselves.

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LIST OF ACRONYMS

2SLS:	Two-Stage Least Square
3SLS:	Three-Stage Least Square
ADF:	Augmented Dickey-Fuller tests
AIC:	Akaike Information Criterion
ARDL:	Auto Regressive Distributed Lag
Baht:	Thai currency unit
BIBF:	Bangkok International Banking Facilities
BOI:	Board of Investment
BOP:	Balance of Payment
BOT:	Bank of Thailand
DF:	Dickey-Fuller
DGI:	Domestic Public Investment
DPI:	Domestic Private Investment
EU:	European Union
FDI:	Foreign Direct Investment
FEV:	Forecast Error Variance Decomposition
FPI:	Foreign Portfolio Investment
GDI:	Gross Domestic Investment
GDP:	Gross Domestic Product
GNP:	Gross National Product
I:	Investment
IMF:	International Monetary Fund
IRF:	Impulse Response Function
LDCs:	Less Developed Countries
M:	Import
MFA:	Ministry of Foreign Affairs
MNEs:	Multinational Enterprises
NIEs:	Newly Industrialising Economies
NESDB:	National Economic and Social Development Board

NSO:	National Statistics Office
OLS:	Ordinary Least Square
SCB:	Schwartz Bayesian Criterion
UK:	United Kingdom
UN:	United Nations
US:	United Stated of America
VAR:	Vector Autoregression Analysis
VECM:	Vector Error Correlation Model
X:	Export

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

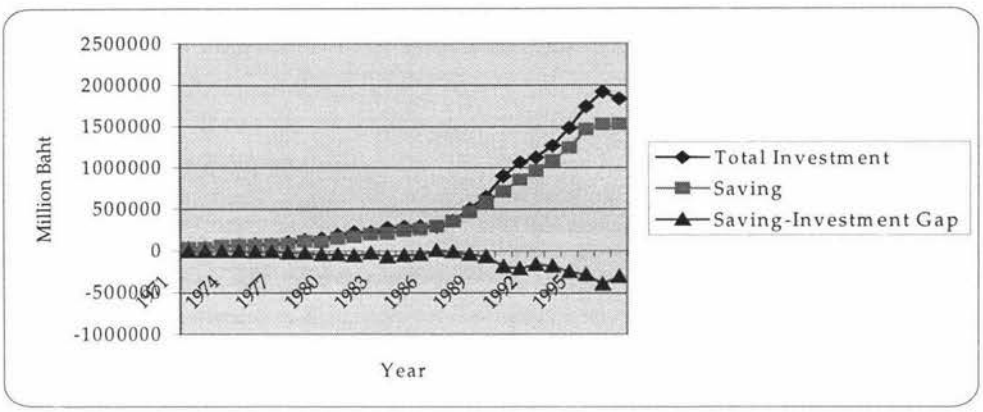
It is known that foreign capital inflows are necessary for developing countries in so far as domestic saving alone is not sufficient for the internal investment needed for a desired rate of growth. Generally, the income per capita of developing countries is rather low. Furthermore, developing countries have difficulties in increasing their export earnings that are mostly derived from the sale of primary products. They are therefore dependent on prices, which are on a declining trend, and trading opportunities on the world market. In addition, tariffs and quotas established by industrialised nations make it difficult for developing countries to increase their export earnings. Hence, it is difficult for developing countries to increase their domestic saving to cover their investment needs.

Thailand is one of those developing countries. Even though it has been successful in economic development during the past decade and its domestic saving is reasonably high, this is not enough to finance the country's need for investment, a need, which has a higher growth rate. This means Thailand also has a domestic saving-investment gap that is rising lately (Figure 1-1) and needs to be filled to support the development of the nation.

Among the different kinds of capital inflows, foreign direct investment (FDI) is a way of closing the domestic investment-saving gap that does not create a fixed-term debt obligation. This means that FDI inflows need not be repaid, and outflows in the form of profit remittances would fluctuate with the cycle of the economy. Given these advantages over other foreign capital forms, FDI has been encouraged by the Thai government since 1960.

Additionally, since the Thai economy has become more open, the foreign sector has played an important role in the Thai economy apart from the domestic policies, i.e., monetary policy and fiscal policy. As FDI is generally directly linked to productive investment, it may have a long-term impact on a country's development. Thus, FDI is an interesting issue of the external sector on which to focus.

Figure 1- 1 Savings – Investment Gap in Thailand between 1971-1997



Source: data extracted from Appendix A, Table A-1

Over the last few decades, net inflow of FDI in Thailand accelerated rapidly. There was a large jump of FDI at the end of the 1980s until the beginning of the 1990s, e.g., from 9,044 million baht in 1987 to 27,964 million baht in 1988 (Table 1-1). Although the amount of FDI recently has been small when compared with domestic investment, its annual growth rate is larger. Moreover, the ratio of FDI to domestic investment also became significantly larger (Figure 1-2). Hence, this implies that FDI may play an increasingly important role, especially in macroeconomic aspects, in the future.

There are also other factors that make this type of investment more attractive to the economy. In the first place, the resources used are likely to be allocated more efficiently, since it is a private venture and we can assume that the profit-maximising principle will be observed. Besides, there are also external economies to be gained from the operation of foreign business. New

production techniques and new skill requirements often accompany the new capital. There will also be a spillover into other indigenous industries, causing the production possibility frontier to shift outwards. Foreign investment brings about direct benefits to the host country in the form of technological progress. It stimulates domestic activities through the linkage effects.

Table 1- 1 Net FDI Inflows in Thailand between 1965-1997

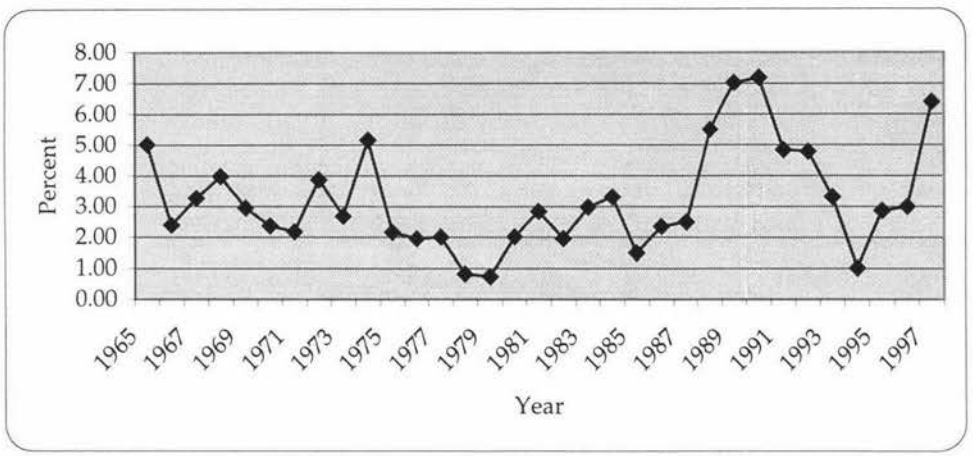
Unit: Million Baht

Year	Net FDI Inflow
1965	870.3
1966	570.6
1967	894.4
1968	1,239.7
1969	1,057.5
1970	890.5
1971	808.4
1972	1,427.1
1973	1,604.9
1974	3,836.4
1975	1,744.8
1976	1,614.1
1977	2,163.9
1978	1,134.8
1979	1,127.5
1980	3,878.2
1981	6,414.4
1982	4,331.4
1983	8,224.9
1984	9,643.6
1985	4,441.8
1986	6,908.1
1987	9,043.8
1988	27,963.5
1989	45,697.5
1990	64,695.0
1991	51,389.1
1992	53,764.3
1993	41,874.0
1994	14,953.6
1995	49,887.0
1996	57,472.0
1997	117,689.0

Source: Bank of Thailand

There are also other factors that make this type of investment more attractive to the economy. In the first place, the resources used are likely to be allocated more efficiently, since it is a private venture and we can assume that the profit-maximising principle will be observed. Besides, there are also external economies to be gained from the operation of foreign business. New production techniques and new skill requirements often accompany the new capital. There will also be a spillover into other indigenous industries, causing the production possibility frontier to shift outwards. Foreign investment brings about direct benefits to the host country in the form of technological progress. It stimulates domestic activities through the linkage effects.

Figure 1- 2 FDI as a percentage of Gross Domestic Investment, 1965-1997



Source: data extracted from Appendix A, Table A-1

However, there are some drawbacks that should be taken into account as well as a number of costs, which FDI imposes on the host country. The direct costs may include the remittance of dividends, interest, royalties, technical fees, and other related payments. Moreover, there may be indirect costs as a possible adverse effect on domestic saving, loss of government revenue from promotional tax concessions and subsidies, and the waste caused by a capital-intensive type of technology. Deterioration in the terms of trade and the pressure on the balance of payments of host countries due to the importation of a large amount of machine equipment and raw materials may be increased.

1.2 Types of Private Foreign Investment

Among the factors affecting economic growth, the availability of capital is one of the most important. Economic development is achieved through the productive employment of labour and the full utilisation of natural resources. Capital is needed for the realisation of both these objectives.

It is self-evident that none of the objectives just noted can be achieved without substantial outlays of capital. Of course capital by itself is not sufficient. It has been recognised that several other factors such as the managerial and technical skills and entrepreneurship are also necessary (Fatouros, 1976).

In most developing countries today, depending on the scarcity of domestic capital and the absence of certain basic facilities, there exist bottlenecks in many important sectors of the economy. The reluctance of local entrepreneurs to undertake long-range investment in new and unexplored fields makes it very important to employ foreign capital in the development process.

Foreign capital performs a useful part in meeting the shortage of domestic resources. We can use it to purchase modern machinery and industrial technology from advanced nations.

The inflow of foreign investment can be divided into two types according to the source of money - public foreign investment and private foreign investment. Public foreign investment may come directly from governments of other countries or from international agencies. While private foreign investment can be classified as follows:

- Portfolio Investment, which is the investment for income only, and
- Foreign Direct Investment, which is the investment both for income and control over sources of income, including management.

Portfolio investment encompasses shares and securities that have a fixed charge rate, and borrowing via bonds and short-term loans, including bank loans and export credits. Foreign direct investment includes equity and loans from parent companies.

There are several major differences between these two types of private foreign investment. Firstly, portfolio investment in credit instruments implies a fixed obligation to repay interest and principal, whereas foreign direct investment implies a flexible repayment obligation directly geared to the success of the investment. Secondly, portfolio flows tend to be more general in character than foreign direct investment, which tend to be industry specific. Thirdly, portfolio investment does not directly affect local ownership and control whereas foreign direct investment gives rise to non-resident ownership and control, in many cases within the context of a large multinational enterprise. Fourthly, portfolio investment normally implies a transfer of capital only, whereas foreign direct investment usually comprises a transfer of not only capital but also a package of auxiliary factors such as technological knowledge, market information, managerial and supervisory personnel, and also organisational experience (Reuber, 1973).

The comparison of portfolio investment versus private foreign investment is important from the point of view of the flexibility enjoyed by the host country in allocating the resources and the effect of the return flows on the balance of payments (Buakanta, 1978). In the initial stages, when the country is industrially undeveloped, greater reliance may be placed on foreign direct investment and official aid, but as industrial progress takes place, and entrepreneurial and technical skills develop, and as the domestic capital market expands, the proportion of portfolio investment may increase. From the point of view of the balance of payments, portfolio investments, which take the form of loans, have an advantage in that the commitment is known beforehand and the repayment of the principal and the interest charges can be planned.

The defect is that portfolio investment can lead to some inflexible situations. If the trade position deteriorates in an unforeseen manner, and the reserve position of the country is also weak, the commitments on account of portfolio investment can result in severe balance of payments difficulties. The outflows of profits and dividends, and the repatriation of capital of foreign direct investments generally follow the economic weather, so that the outflows may tend to be large when the country can afford to pay more, and less when it can not. Moreover, if a foreign direct investment is not profitable, no return inflow is required on the equity components (Buakanta, 1978).

1.3 Foreign Direct Investment: A Brief Description

From the earlier discussion, we may conclude that FDI is taken to mean investment in operationally linked subsidiaries or affiliates as contrasted with portfolio investment, which is investment in equity and debt securities through the medium of an impersonal capital market.

Direct investment entails control over the operations of the host country firm through the provision of capital, technology, entrepreneurship, and access to markets as a package instead of their being made available separately through the marketplace.

Many economists have attempted to define the meaning of FDI or direct investment as follows:

- *"Direct investments are those investments from abroad which involve some control over the management of an enterprise or a partial foreign ownership. It consists of initial investment, re-invested earnings, and other long-term capital supplied by the direct investors"* (Wang, 1992, p.4-6).
- *"Direct investment involves control of an enterprise, control in the managerial sense of decision making power"* (Kobrin, 1977, p.30).
- *"Direct investment implies the investing unit (usually a business enterprise) purchases the power to exert some kind of control over the decision making process*

of the invested-in unit (again usually a business enterprise)....." (Dunning, 1971, p.4).

- It involves what Kindleberger refers to as the *"locus of decision making power."* (Kindleberger, 1969, p.4.)

In addition, FDI involves a flow of resources, such as managerial skills, technology, and marketing knowledge that may or may not be accompanied by a capital transfer. *"Direct investment represents not so much an international capital movement as capital formation undertaken abroad"* (Kindleberger, 1968, p.390.) Capital may be transferred from the source country, and equity may be obtained in exchange for management or technology or it may be raised either locally or in a third country.

FDI can and does serve as a vehicle for the transfer of needed resources – *technology, managerial skills, marketing knowledge, export outlets and capital (often in the form of critically short foreign exchange)* (Stikker, 1968, p.14) – from industrialised to developing countries. However, FDI is a very singular vehicle. The United Nations report on multinational corporations in world development observes that, *"It has long been recognised that private direct investment through the multinational corporation is unique in providing from a single source a package of critical industrial inputs..."* (UN, 1973, p.49). The unique nature of FDI is a function of its complete contribution; it transfers not only resources but also institutions and often-entire formal organisations.

Furthermore, the resources and skills are oriented towards a specific corporate goal or objective; they are transferred in the context of a specific application. Gabriel notes that transmission of corporate skills *"transcends the supply of product or process centred information."* It involves building new organisations, and it *"requires not only the transplantation of personal abilities, but also the infusion of institutional skills and values; not only the transmission of techniques, but also changes in basic attitudes on the part of the recipient."* (Gabriel, 1967, p. 73).

Carr (1978, p. 2) gives an example of direct investment as follows:

> *"The statistician of the Commonwealth of Australia deems direct investment to have taken place when investment is made through a branch of an overseas company or when there is ownership of 25 percent or more of a local company's voting stock by one company or a group of companies incorporated in one overseas country, or 50 percent private overseas ownership otherwise. The line is, of course, arbitrary and there may be cases where control can be secured with a smaller proportion of equity contribution through the use of exceptionally complex technology, which is constantly evolving. In practice, however, the owners of such technology usually desire a high equity participation so that the definition of the Australian statistician is believed to capture the vast bulk of FDI."*

1.4 Importance of the Study

As mentioned above, foreign investment brings along the direct benefits to the host country in the form of technological progress. In addition, it also stimulates domestic activities through the linkage effects.

By introducing relatively advanced technology, a foreign firm may impart demonstrable effects on local competitors. Furthermore, foreign firms may create forward and/or backward linkages and thereby affect upstream and/or downstream industries. On the other hand, because they possess more advanced technology and have easier access to finance, foreign firms may impede existing local competition and the entry of potential competitors. Therefore FDI may stimulate domestic private investment to a certain degree.

Likewise, FDI inflows also have trade effects on the economy both directly and indirectly. On the import side, as a direct effect, it increases the import of raw materials and capital equipment for investment that would otherwise not have taken place. As an indirect effect, FDI can also influence imports by appreciating the real exchange rate to stimulate unrelated imports and this in turn affects the transfer by increasing the current account deficit. For the export

side, theoretically, export supply is determined by the relative prices of exports and domestic goods while demand for exports is determined by the real world income growth. However, according to the attractiveness of Export-led Industry promoted by the Board of Investment (BOI), the FDI may be another factor that accelerates exports significantly.

There are a number of empirical works about FDI in Thailand; several of these are determinants of FDI in Thailand, and show the economic impact and the role of FDI on the manufacturing sector. However, there are not many studies about the impact of FDI on the economy's import, export, and domestic private investment. Given the recent trends of rapidly increasing levels of FDI, it would be interesting to assess the extent to which FDI has contributed to the country's domestic private investment and trade in Thailand.

1.5 Objectives of the Study

This study mainly emphasises the economic effects of foreign direct investment (FDI) on important macroeconomic variables, i.e., imports, exports, and domestic private investment. In addition, the study investigates if there is any inter-relation between these key variables.

1.6 Scope of the Study

This study concentrates only on FDI in Thailand in the following respects:

(1) Net inflow of inward FDI, and

(2) Impact of FDI in the aggregate level.

The study employs annual time series data that cover periods between 1965 and 1997. This period was chosen since, before 1965, net inflow of FDI in Thailand was of little significance due to the lack of investment promotion and economic and social development plans from the Thai government. Furthermore, this

study period provides a sample that is large enough to obtain unbiased estimates.

1.7 Method and Data

The estimations in the Study are conducted using the autoregressive distributed lag (ARDL), which minimises the possibility of estimating spurious relations while retaining long-run relationship information (Hendry, 1995).

The vector error correction model (VECM), variant of the vector autoregression (VAR) analysis, is applied to investigate the inter-relation between trade (imports and exports), domestic private investments, and FDI. Both impulse response functions and variance decomposition techniques are used to analyse such inter-relation.

All of the data used are obtained from secondary sources, i.e., the Bank of Thailand (BOT), the National Economic and Social Development Board (NESDB), the National Statistical Office, and the International Monetary Fund (IMF).

1.8 Organisation of the Study

This thesis consists of six chapters, each discussing specific stages of the research progress. It begins, in the first chapter, with an introduction describing the background, objectives, scope, and organisation of the study along with descriptions of private foreign investment and foreign direct investment. In the second chapter some theoretical and empirical literature is reviewed. The third chapter provides an overview of the Thai economy emphasising historical, trend, and performance of FDI. The fourth chapter is devoted to the derivation of the macroeconomic model of FDI and methodologies used in the study. The fifth chapter gives the empirical results

accompanied by a discussion of the implications of these results. The concluding chapter summarises the findings of the study.

CHAPTER 2

LITERATURE REVIEW AND THEORETICAL APPROACH

2.1 Introduction

This chapter explains the various types of foreign direct investment (FDI) in more detail. The chapter also reviews available literature in the area of FDI. As FDI is an interesting issue, there are a number of FDI studies dispersed among many fields. For simplicity, the literature of FDI already mentioned can be categorised as follows: *determinants of FDI, macroeconomic impacts of FDI,* and *microeconomic studies of the effects of FDI on specific industries.* This chapter purposely examines the former two on the basis of theoretical literature. There is also an examination of the empirical evidence of the macroeconomic impact of FDI in the same section. In the second section of this chapter, the types of FDI are presented. In the third section, determinants of FDI will be discussed. Since there are a number of theories concerning the determinants of FDI or the occurrence of multinational enterprises (MNEs), this section will briefly review some of these important theories. In the fourth section, two important theories in trade-theoretical approaches will be considered. Macroeconomic impacts will be examined in the fifth section, along with their empirical evidence, and finally, in the sixth section, a summary of the chapter will be given.

2.2 Types of Foreign Direct Investment

According to Fukushima and Kwan (1995), FDI can be broadly categorised into four types according to the objective of investment as follows;

- Outsourcing

The objective of this type of FDI is to secure the supply of production factors in an advantageous way. Since factors of production include labour force,

infrastructure, and natural resources, this production factor-securing FDI can take various forms. Because the main purpose of this type of FDI is to reduce production cost rather than seek entry into the host country's market, it can also be regarded as focusing on cost reduction and export orientation.

- Trade barrier circumventing

The second type of investment aims at substituting local production for export where trade barriers exist in the importing country. This type of FDI requires a market size of the host country that is larger than a certain level and that one expects to see further growth in the future. In some cases, after trade restrictions have been imposed in the form of order marketing agreements or voluntary export restraints, export companies have no choice but to begin producing in the country of the former export market.

- Market and technology accessing

This type of investment aims at creating a new comparative advantage by accessing information, technology, and marketing channels. The basic mechanism for creating a new advantage here is to learn and absorb advanced technology from the host country, or to study the art of marketing and provide new services of the investing company's own, and then combine these with the internal managerial resources held within the investing company.

- Round-tripping

The fourth type refers to domestic investment under the guise of foreign investment so as to take advantage of fiscal and other benefits given to foreign investors. Though in reality the domestic capital stays at home and makes investment at home, it pretends to take the form of foreign capital, which is then invested back at home. In most cases, domestic funds are siphoned outside the country illegally, and then transferred back to the home country, thus making a round trip.

In case of Thailand, the type of outsourcing has by far been the most important objective for the home countries. The reason is because this type of investment is common for labour-intensive products and processes such as textiles and the assembly of electronic products. Production tends to be relocated in stages from more advanced countries to less-developed ones in search of lower costs of production. In addition, in most cases, the output from these offshore production bases is exported, either back to the home country or to the other countries.

2.3 Determinants of Foreign Direct Investment

Before 1960, there was no established theory of FDI. Earlier, economists explained FDI by hypothesising the differential rate of return on capital since they considered FDI as one form of international capital movement, similar to that of international portfolio investment. FDI was postulated to flow out of countries with low returns to those countries that expected to yield higher returns. Unfortunately, these ideas could not explain the FDI phenomenon after the Second World War. In the postwar period was a rapid growth of FDI. While the US was rapidly expanding its direct investment abroad, there was also FDI in the US. The existence of cross movements may indicate that the interest rate theory cannot by itself explain the movements of direct investment. Since then, a number of theories have been developed to explain FDI phenomena on a more comprehensive theoretical basis.

2.3.1 Industrial Organisation Theory

Since the international capital movement theory failed to explain FDI, the first contribution to the theory of FDI is the industrial organisation theory, so-called oligopolistic theory because it concerns oligopoly market behaviour.

Stephen Hymer was the pioneer in the study of MNEs to employ this theory. He separated FDI from other foreign capital movements by the word 'control'

or 'ownership'. He indicated that control of foreign enterprises was essential in order to appropriate fully the rents or returns as well as to offset the advantages to the firm possession. In addition, the full appropriation of the firm's advantage can be achieved through international horizontal integration and vertical integration (Hymer, 1976).

According to Hymer, to operate or control an enterprise in a foreign country is necessary since the world market is imperfect. In other words, he wanted to argue that the possession of monopolistic advantage is a necessary condition for FDI.

He made this argument because foreigners involved in FDI had to incur additional costs when they entered a new environment where scarcity of the host country's information, difficulty in communication, risk in exchange rates, and sometimes discrimination from government and people in that host country existed for them only.

Therefore, for firms to own and control foreign value-adding facilities, they must possess some kind of innovative, cost, financial or marketing advantages specific to their ownerships, which must be sufficient to offset the disadvantages they faced in competing with indigenous firms in the country of production.

These firms' ownership-specific advantages have been identified by various writers on international production in the 1960s and 1970s, notably Kindleberger (1969), Caves (1993), and Johnson (1970). Hymer specified the ownership of a differentiated product or process as the advantage of the source-country firm. Kindleberger corroborated Hymer's study and illustrated these monopolistic advantages by citing four main sources of separate advantages.

First, the imperfect competition in goods markets, involving product differentiation, special marketing skills, retail price maintenance, and

administered pricing. Second, the imperfect competition in factor markets, involving the superior management skills, the existence of patented or unavailable technology, discrimination in access to capital. Third, economies of scale, involving plant economies of scale and economies of vertical integration. And finally, government intervention of the host country, particularly those forms restricting production or trade (Kindleberger, 1969).

The contribution by Caves has recognised both Hymer's approach and that of Kindleberger. Caves considered FDI as market behaviour by investigating two forms of FDI: horizontal integration and vertical integration. He concluded that a firm's main advantage enabling it to make horizontal investments to produce abroad the same line of goods as they produced in the home market is the ability to differentiate a product. Such product differentiation is fundamentally based on technology, design, brand name and subjective distinction created by advertising.

For vertical foreign investment, producing abroad a raw material or other input to the production process at home, Caves specified the reasons as follows. In the case of foreign investment in raw material in less developed countries, the reason might be shortages of local social overhead capital and entrepreneurship in home country; but in the case of vertical foreign investment among developed countries, there are two major motives. One is the avoidance of oligopolistic uncertainty and the creation of barriers to entry of new rivals; and the other motive arises when the processing industry is handled by relatively few sellers. By controlling their input sources, the existing firms may enjoy higher than competitive profit rates without attracting new rivals (Caves, 1993).

According to Johnson (1970), the transfer of knowledge is the crux of the FDI process. Once new productive knowledge is innovated, it has the character of a public good in the sense that there is no exclusion in exploiting it. Since the knowledge can be transmitted easily across national boundaries, it can be

exploited by a subsidiary without additional cost for such knowledge, which gives a firm a temporary monopolistic advantage over its rival firms.

Furthermore, Hymer's industrial organisation theory also explains why direct investment is preferred to exporting or licensing in exploiting such monopolistic advantages. The reason is profit maximisation. Exporting can be restricted by tariff and transport cost barriers, or other advantages of direct presence in the local market, such as adapting a product to suit the local environment, thus stimulating the local demand.

Hymer argues that, in the oligopoly market structure, licensing to a host-country firm causes some significant costs to MNE. One cost arises from the market impurity, i.e., difference in signal evaluation between licensor and licensee: thus there is a difficulty of reaching an agreement between them. Another cost is the inconvenience of controlling price and output abroad. Yet another cost is that the licensee may discover a process that substitutes for the advantages, which in turn make the licensor lose the advantages (Hymer, 1976). Therefore, in order to maximise profit or minimise cost, the owners of advantages should operate their own enterprises abroad.

Even though the industrial organisation theory has made a great contribution in elaborating on FDI, it is criticised by many economists in various ways. Firstly, it ignores location factors in elaborating on international investment. It may answer the question of why firms decide to operate an enterprise abroad, but it fails to answer the question of why firms decide to locate their activities in one country rather than another. Secondly, the notion of ownership-specific advantage explains FDI only in the short run when endowments of proprietary knowledge among firms are fixed. Thirdly, it concentrates mainly on the relationship between direct investment and local firms in the host country. Hence, it is essential to take into account other theories that concern location-specific factors and develop a general concept of FDI.

2.3.2 Internalisation Theory

Another main theory that broadens the knowledge frontier about FDI is the internalisation theory. In 1968, Hymer's contribution introduced this theory drawn heavily on the ideas of Coase (1937). In 1970s and later, it was extended and developed by a number of economists, notably McManus (1972), Buckley and Casson (1976), and Rugman (1980).

These internalisation economists argue that there are imperfections in these markets for important intermediate products (intangible products); for instance, innovated knowledge, human capital, marketing and management skill. These market imperfections stem from their appearance of being influenced by natural and government-induced externalities. Therefore, linking different activities through these markets generates time lags and transaction costs to firms. Consequently, firms are induced to replace these external markets with their own internal markets for these products. Once the firms internalise these intermediate product markets across national boundaries, FDI is then generated. In addition, this internalisation is undertaken because its benefits outweigh its costs.

Buckley and Casson (1991) suggest that there are at least five significant advantages of internalisation. Firstly, it avoids time lags and it increases the ability to control and plan production. Secondly, it increases combined profits by facilitating discriminatory pricing. Thirdly, it avoids an unstable bargaining situation that might be caused by a bilateral concentration of market power. Fourthly, it avoids the uncertainty caused by unequal knowledge of the nature or value of a product between buyer and seller. In other words, it eliminates "buyer uncertainty". Finally, it minimises the impact of government interventions in international markets (such as tariffs, restrictions on capital movements, etc.) through transfer pricing.

Internalisation occurs as a response to market failure in various types of knowledge, involving management know-how, process technology, etc. The

reason is that the knowledge bears a public good character - once it is disclosed, others can utilise it with no additional cost. The markets for knowledge are highly imperfect because of the weakness in government enforcement in securing the knowledge, and the high costs of enforcing rights and controlling information. Also, internalisation is likely to be advantageous in other markets, namely perishable agricultural products, intermediate products in capital-intensive manufacturing processes, and raw materials whose deposits are geographically concentrated (Buckley and Casson, 1991).

Besides the benefits, there are also costs of internalisation, which arise mainly from additional resource costs, communication costs, and the administrative costs of managing an internal market. Internalisation of markets can push up the resource cost by distorting the operating scale of at least some markets, and thus reducing economic efficiency below what it would be under perfectly competitive external markets. Higher communication costs attributable to internalisation stem from greater geographical distance between the regions linked by the market; and greater "social distance", i.e., the dissimilarities in language and the social and economic environment. Apart from these main costs, there is the cost of political discrimination against foreign-owned firms as a result of political relations between the nations concerned.

Hennart (1986) suggests that the MNE's significant costs of internalisation are the transaction costs in the international market for factors of production, and especially labour. He points out:

> *The firm now incurs the market transaction cost involved in hiring workers and managers in the foreign country. It runs the risk of having its employees not honor the letter or the spirit of their employment contract by, for example, leaving the firm's employ with its know-how and trade secrets.*

He also suggests that trade and investment may not take place at all, provided that both market transaction costs and internalisation costs are too high.

Internalisation theory is used to explain FDI by means of the existence of transaction costs in imperfect intermediate-product markets. In order to maximise net returns; the firm has to internalise those activities. To do that, the firm need not be restricted in it own country. It can internalise activities across national boundaries, which answers why FDI exists. Furthermore, FDI under the internalisation theory also takes location-specific advantages into consideration.

This is because different stages of production require different combinations of factors and they are therefore best carried out in different countries, according to factor endowment and the law of comparative advantage. However, while the theory explains why firms prefer direct production to exporting or licensing in their foreign operations, it fails to explain the reason why the large enterprises prefer to service foreign markets through international production rather than by exports and thus through domestic internalisation. Moreover, it does not explain why the pattern of foreign involvement (the mix of export, licensing, and investment) by MNEs differs across countries.

2.3.3 Location Theory

All the preceding theories address the question as to why firms are likely to invest outside their own country boundaries. At this point, then, it is useful to discuss the location theory, which can also answer the question "Where do firms locate their foreign-affiliate operations?". However, the explanations of those preceding theories about FDI implicitly require a theory of location.

Generally, the theory of location is concerned with supply (cost factor) and demand (market factor) variables that influence the spatial distribution of production processes, R&D activities, and the various administrative functions of the firm. Location theory explains the existence of FDI by the location-specific differential factor. The essence of the theory is that host country must possess some locational-specific advantages over the home country of the

foreign investor in order to attract him to locate his subsidiaries there so as to fully exploit those locational advantages.

These advantages could originate from the host country's relatively lower wages, abundant raw materials, investment incentives, membership in preferential trade areas, tariff and non-tariff protection, creation of free-trade areas, etc. Therefore, the location theory explains FDI not only in the sense of the relative costs facing a MNE with a choice of locations, but also in the sense of the motives for international expansion (Buckley, 1985).

In contrast, Dunning (1973) argues that a general theory of location is useful in explaining aspects of FDI. It can be extended easily across territorial constraints to account for international investment and international production in a broader sense. Hence, the location explanation for FDI can be discussed in terms of the following location-specific factors.

- *Availability and Cost of Inputs*

In order to choose the location of production, a firm always considers the source of inputs and cost of production as a primary goal. Similarly, the existence of FDI may be due to the availability in its host country of some input that are very scarce in the home country, or the lower cost of inputs in the host country. This location-specific factor can often be exemplified by direct investment in the developing countries that have lower labour costs.

- *Marketing Factors*

There are several advantages of locating a production plant near the market. In doing so, the firm can obtain more market share; tariff barriers can be avoided, and transportation costs can be reduced. As well as, the marketing factors, such as market size and market growth of the host country, other factors reflecting the capability of the MNE to exploit both production and non-production economies of scale, frequently attract international investment.

• *Bypassing Trade Barriers*

The existence of trade barrier policies stimulates the occurrence of direct investment. FDI is sometimes motivated to enter a country which is not subject to trade restrictions. Then the products are exported to those countries that have imposed restrictions on the exports of the investing country (Chen, 1983). In addition, the import substitution strategy adopted by LDCs has been also responsible for inducing foreign firms that used to export to them from home countries to direct investment there.

• *Government-Policy Factors*

Other factors that attract FDI are the incentives offered by the governments of host countries: lower tax rates, better infrastructure, greater political stability, and the allowing of more profit remittance. These create a more favourable investment climate, which affect the MNE's perceptions of risk and thus influence the location of their manufacturing operations.

Nonetheless, the location theory neglects to explain the ownership-specific advantage possessed by foreign firms in order to outcompete local firms.

2.3.4 Currency Areas Theory

Apart from location theory, which is one of the macroeconomic theories of FDI, Aliber's currency areas theory should also be mentioned here. Robert Z. Aliber (1970) developed a theory of direct investment based on currency areas. He rejects explanations of FDI based on superior managerial skill since any such types of superiority should be reflected in cost and exchange rates.

Aliber argues that the pattern of FDI could be explained in terms of the existence of different currency areas. Some currencies become stronger when compared with others at a certain period of time and the market is subject to a bias in evaluating the currency premium on weaker currencies. He maintains that portfolio-investors tend to ignore the exchange risk on the foreign earnings

of a firm. As a result, firms from stronger currency areas are able to borrow at lower costs and capitalise the earnings on their FDI in weaker currency areas at higher rates than the local firms. The higher the share of capital in the value added and the amount of the premium on local currency, the greater the comparative advantage a foreign investor would enjoy over local firms.

His approach has been tested and mostly accepted. The majority of economists who have tested this theory statistically have come to the conclusion that devaluation encourages inflows of FDI and discourages outflows of FDI. Froot and Stein (1991) corroborated this conclusion by introducing the wealth concept. Changes in exchange rate mean changes in wealth that would change the demand for direct investment.

Moreover, Aliber's approach not only explains the cause of FDI but also explains the pattern of FDI in the dynamic sense, since change in exchange rate (depreciation or appreciation) may influence the timing of a particular FDI. However, it is only a partial explanation since it does not explain the cross investment between countries with similar currency or FDI of a country into another belonging to the same currency area. Apparently, there should be complementary in the micro-orientation of industrial organisation theory and the macro-orientation of international trade theory in order to obtain a satisfactory theory of FDI (Johnson, 1972).

2.4 Trade-theoretical Approaches

As far as the distinction between FDI and international trade is concerned, the assumptions of classical international trade theories have been challenged. Those assumptions exclude the phenomenon of foreign direct investment whose presence is marked by the possession and control of the means of production across international boundaries - the theories of foreign direct investment, and its impact on host countries. The most common approaches to such purposes are the Product Life Cycle approach and the Eclectic approach.

2.4.1 Product Life Cycle Theory

The product life cycle theory is basically the result of a search for unifying concepts and theoretical frameworks to understand both international trade and capital movements. Raymond Vernon was the pioneer in employing the product life cycle theory to explain the behaviour of FDI. According to Vernon (1966), the development of a product is divided into three stages.

In the first stage - the new product stage - the new product is innovated, produced, and sold in the home market possessing the highest income and technology.

At the second stage - the maturing product stage - the product becomes rather standardised or mature, and is exported to other countries which are most similar to the home country in demand patterns and supply capabilities. Since its competitors can produce the product at this moment and there exists a rapid growth in other advanced countries' demand, the firm begins to consider setting up a production plant abroad. The firm makes decision in choosing between FDI and exporting based on the relevant cost factors. However, expansion of demand and growing competition in these countries finally leads to FDI by the innovating firm in these countries. Therefore, other countries having the next highest level of income and technology will be the first recipients of direct investment.

In the third stage - the standardised product stage - the innovated product now becomes completely standardised and the market becomes more competitive. Thus, its production technology is no longer an exclusive possession of its innovator. Encountering price competition from other producers, the innovating firm decides to invest in developing countries to seek cost advantage, especially labour costs. At this stage, the product that has been transformed in developing countries may be exported back to its home or to other developed countries.

From the sequence of product development, this theory also suggests that there is the substitution of FDI for exports in host countries in the final stage of a product life cycle.

Over time, however, this theory has been modified many times in order to explain the existence of the recent FDI phenomena. The scope of this theory has often been widened. It pays attention not only to labour costs as locational advantages of host countries but also to other factor costs, and it is no longer rigidly dependent on a sequential relationship between product innovation, export, and FDI. Later, Vernon reconsidered his theory and observed that it had less power in elucidating the FDI phenomena (Vernon, 1979). He indicated that an increase in the geographical reach of many of the enterprises involved in the introduction of new products, and the reduction of the gap between the US market and other national markets in size and factor cost configuration are the two reasons accounting for such change. Thus, the change in the international environment weakened some critical assumptions of the product life cycle theory. Therefore, its power to explain the causes of FDI has declined. However, it still prevails as a guide to the motivation and response of some enterprises (i.e. highly innovative industries) in all countries of the world. In other words, its strong traces of sequence are likely to remain.

Although the product life cycle theory explains FDI phenomena in a dynamic sense, it fails to explain why the production of a new product begins simultaneously at home and abroad. Moreover, it is inadequate to explain FDI from developing countries or from Japanese enterprises.

Kojima (1978) has extended Vernon's approach to the product life cycle hypothesis with the help of Akamatsu's catching-up product life cycle, which may be more suitable for developing countries, that

> *"...In a developing, or catching up, country, the product cycle starts with imports of the new product with superior quality. Imports reconnoitre and map out the country's demand, and once increased demand approaches the*

domestic production threshold, domestic production is economical. A learning process follows and is assisted by importing technological know-how and by direct foreign investment. The expansion of production then leads to the exploitation of economies of scale, increases in productivity, improvements in quality and reductions in costs. This involves an import-substitution process. But as domestic costs reach the international competitive cost threshold, foreign markets are developed, the scale of production is extended further, and costs are reduced again. Thus the expansion of exports that is originally made possible by the growth of domestic demand in its turn provides a stimulus to industrial development. In sum, it may be appropriate to call such successive development of imports, domestic production, and exports the catching up product cycle. It should be noted that such a product cycle takes place only for standardised, rather than new products, and in developing rather than in industrialised countries."

By the above explanation, Kojima's theory is also called "the Flying-Geese Pattern". It is mostly focused on Japanese FDI in Asia. In brief, in this flying-geese pattern of economic development, each country moves up the ladder of industrialisation based on its stage of industrial development, while maintaining international division of labour by exporting those industrial products in which is has a comparative advantage. Both the catching-up and caught-up countries make industrial adjustments in a positive way, aiming at a higher stage of industrialisation that makes dynamic growth in the entire region possible.

Finally, Livingstone (1989) has broken the international product life cycle concept into four stages. In the first stage, a significant technological breakthrough is likely to occur in one of a small number of Western technologically advanced economies. Then, in the second stage, the breakthrough will spread rapidly to those others who were in the race, i.e., those who also have the technological infrastructure, generally other advanced countries. This would be the equivalent of the growth stage in the conventional

product life cycle. In the third stage, the product then becomes available in other developing countries – those countries that did not possess the technological infrastructure to develop the process, but which can simply reproduce a process elsewhere. This stage is equivalent to maturity in terms of the conventional life cycle. It is likely to be encouraged by host countries' policies of import substitution. In the last stage, the tide of exports is turned. The developing countries begin to export the products back to the countries of origin. The process is likely to be encouraged if the trademark or brand name of the product guarantees access to the existing markets in the developed countries being a company already well established in such markets.

2.4.2 The Eclectic Theory of FDI

John H. Dunning developed a general theory of FDI by synthesising existing theories of FDI. This theory is called the eclectic theory of foreign direct investment or, sometimes, *Dunning's eclectic theory*. It relies on the OLI paradigm: Ownership-specific advantages, Locational advantages, and Internalisation advantages. Dunning and Narula (1996) explain these as following:

- Ownership-specific advantages (O) include marketing skills, research and development skills or production skills that allow firms to provide goods and services more competitively in their countries and in other countries.
- Location advantages (L) include natural resources, domestic market potential, labour forces, political stability, and government policies. Those advantages are the main reasons why a firm chooses to invest in one country rather than another.
- Transaction costs explain why foreign and local firms choose to combine the Ownership advantages and Location advantages through internalising process to overcome the transaction costs such as transport costs, different taxes and charges between countries (tariff, quota) or other market imperfections.

It is argued that countries tend to go through five stages along the investment path, either to be outward and/or inward direct investors depending on the change of above-mentioned three sets of factors.

Stage 1: In the first stage, the **L** specific advantages of a country are insufficient to attract inward investment, except its processing of natural assets. Its deficiency reflects limited domestic markets due to low per capita income; inappropriate economic systems or government policies; inadequate infrastructure; and most important of all, poorly educated trained or motivated labour force.

Stage 2: In this stage, inward direct investment starts to rise while outward investment is still low or negligible. A country must possess some desirable **L** characteristics such as good physical infrastructure and human resources, and a large domestic market. These in turn will attract foreign direct investors to invest in the area of natural and primary commodities with some forward vertical integration into labour-intensive low technology and light manufactures. The **O** advantage of domestic firms will have increased from the previous stage as a result of the development of support industries clustered around primary industries.

Dunning and Narula (1996) also mention at this stage that outward direct investment will emerge, however, at a very low growth rate and not sufficient enough to offer the rising rate of growth of inward direct investment. As result, during second stage, countries will increase their net inward investment

Stage 3: A gradual decrease in the rate of growth of inward direct investment and an increase in that of outward investment mark Countries in this stage. The country's **L** advantages increase in the sense that the domestic market is enlarged with rising in income and wage rate, and domestic innovatory capacity is improved. On the other hand, as an increase in the domestic wage

rate occurs, the country's comparative advantage in labour-intensive activities will be reduced.

As a result, they reported that the domestic production moves towards more technology-intensive manufacturing. The original **O** advantages of foreign firms begin to deteriorate as domestic firms acquire their own competitive advantages and compete with them in the same sector. The inward foreign investment will shift towards efficiency seeking production and away from import substituting production while outward direct investment will be directed to countries at lower stages

Stage 4: This stage is reached when outward direct investment stock exceeds or equals the inward investment stock, and the rate of growth of outward FDI is still rising faster than that of inward FDI. At this stage, the **L** advantages will be based almost completely on created assets, and the fact that domestic firms can compete effectively with foreign firms and penetrate foreign market.

Stage 5: In this stage, Dunning and Narula (1996) show that the net outward investment first falls and later fluctuates around the zero level. At the same time, both inward and outward FDI are likely to continue to increase. This is the scenario which advanced industrial nations have now approached. At this stage, there is increasing propensity for cross-border transactions to be conducted within MNEs and as countries converge in the structure of their location-bound assets, their international direct investment positions are likely to become more evenly balanced. For the MNEs, the **O** advantages will be "less dependent on their country's natural resources but more on their ability to acquire assets, to organise their advantages efficiently and to exploit the gains of cross-border common governance".

Recently, Dicken (1992) has concluded that the eclectic approach's broad-ranging quality is especially useful. The three general and interrelated principles are fundamental to an understanding of international production.

The ownership-specific advantages refer to size and market power, including technology. The internalisation advantages act as an incentive for a firm, bypassing the markets, which are imperfect and uncertain. Then the location-specific advantages include variations in market size and composition, the political dimension, and spatial variations in production costs.

2.5 Macroeconomic Impacts of FDI

Consistently, foreign direct investment inflows affect both host and home economies. In line with the main objective of the study, we will concentrate more on macroeconomic impacts of FDI inflows on the host country than those of the home country will.

The discussion in this section is organised according to the following topics: (1) private investment, (2) trade balance effects, (3) transfer of technology and labour training, (4) capital stock and resource shifts, (5) market structures, and (6) empirical evidence, the most important part.

2.5.1 Private Investment

For a number of reasons one would expect FDI to have an impact on the level of private investment.

Jansen (1995) discussed these reasons as follows. First, FDI is part of private investment, so that any increase in FDI will contribute to an increase in private investment. In addition, FDI and local private investment are likely to be determined, to a considerable extent, by similar variables reflecting the investment climate of the country. An increase in FDI is, therefore, likely to be accompanied by an increase in local investment. This increase in investment provides a demand impulse with further multiplier and accelerator effects on income and investment.

Second, new FDI projects may invite complementary local private investment that provides input to, or uses outputs of, the foreign firm.

Third, it is likely that private investment increases by more than the FDI inflows because foreign equity capital finances only part of the total investment project. A substantial part of foreign investment projects is usually financed from local financial markets. This is clearly the case if the project is a joint venture, but even in cases of full foreign ownership, local financing is quite prevalent.

In a recent article, Buffie (1993) presents an analytical model, which under rather restrictive assumptions, shows that FDI in a protected, domestic market-oriented manufacturing sector is likely to crowd out domestic investment, while FDI in an exported-oriented primary sector or in a manufacturing export-processing zone will crowd-out domestic investment and will lead to higher income and employment.

2.5.2 Trade Balance Effects

Foreign ownership may be expected to improve the trade balance for several reasons. Production in host country affiliates of MNEs could potentially displace imports from either parent companies or other foreign suppliers. More important, the "supply-side" effects of FDI, including the transfer of technological or other competitive advantages from foreign parents to their host country affiliates, could expand the host country exports.

Over time, however, new investments result in higher productivity and improved international competitiveness. In fact, in the initial period following a direct investment, the trade balance typically worsens. Foreign-owned firms in the early stages of operation may look to the parent country as a source of capital equipment and supplies, thus increasing imports. The amount of actual production that takes place locally, known as "local content" or "local value added", may initially be relatively small.

The trade balance improves over time to the extent that the foreign-owned firms switch to local suppliers of parts and components, as well as manufacture products that displace imports, and begin to export their own products. The dissemination of the technological or managerial advantages of the foreign-owned firm to domestically owned firms may also improve the competitiveness of the entire industry and result in a further long-term trade balance (Orr, 1991).

Theoretically, FDI and exports can be substitutes or complements, and the effect on imports cannot be predicted *a priori* (Wilamoski and Tinkler, 1997). Table 2-1 summaries several ways FDI can affect exports and imports.

Table 2- 1 Possible Relationships between FDI and Trade

FDI Activity	Effect on Home Nation	
	Exports	Imports
Host nation production requires home nation capital goods.		positive
Host nation affiliate production requires inputs from parent firm.		positive
Host nation is a low-cost source of production for sale in host nation (substituting for home production).	Negative	
Host nation is a low-cost source of production for sale in home nation (substituting for home production).	Positive	
Parent has un-exportable firm-specific advantages (FDI raises demand for parent firm's product).		positive
Host nation affiliate production raises demand for higher-end products from home nation.		positive
As host nation supplier network grows, inputs from parent firm decrease.		negative
Transfers of technology and management skills increase competitiveness of host nation firms.	Negative	positive
FDI raises host nation growth rate.		positive

Source: Wilamoski and Tinkler, Foreign Direct Investment, **Atlantic Economic Journal**: March 1999, Vol.27, No.1, p.25.

If FDI substitutes host country for home country goods for sale in its own country market, then the home country exports will fall. However, exports of

the home country will rise if host country production requires inputs from the home country parent or unaffiliated firms. The home country exports of inputs will rise if lower host country production costs raise the host country's demand for the MNEs' product (Blomstrom et al., 1988). However, imports may rise or be unaffected by the home country FDI in the host country.

Lin (1995) explains the possible effects of FDI on trade between host (A) and home (B) countries, devised from the standpoint of A investing in B and receiving investment made by B[1], as summarised in Table 2-2. The effects depend on whether the investment is made to produce services (S), final goods (F), or materials including parts (M) for markets A, B, or C (other countries). Tradable goods are classified into three categories: equipment and machinery (E), materials (M), and other goods (G).

To explain the table we consider three cases. First, if country A invests in country B to establish a trading company, trade between A and B is expected to expand.

Second, country A invests in country B to produce final goods because of low wages, market proximity, trade barriers, or internalisation, or for other reasons. A common practice is for A to export to B equipment and machinery for plant installation and then material for processing or parts for assembling. Thus, A's exports of equipment and material to B should increase.

The export of equipment may occur only once, but that of material tends to be recurrent unless the supply is later replaced by a new source other than country A. Consequently, country A's imports of final goods made in country B may increase. The increased imports may reduce the imports from country B of the

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[1] The effects of outward (or inward) FDI on bilateral trade are complicated. They will depend on what products are produced in the host country, for which market they are produced, and then which tradable goods are being considered. Table 2.2 lists all the possible cases, which may arise.

material previously used by country A to produce the final goods at home. If the final goods formerly produced in country A were exported to country B, the exports are expected to decrease as result of export displacement.

Third, when country A invests in country B to produce primary or intermediate material or industrial parts, exports of equipment and/or material from country A to country B may increase. The produced material may be shipped back to country A with or without some of the previous imports of material from country B being replaced. The final goods made from the imported material at home may return to country B from country A.

The above discussion is made for outward FDI and trade between the home and host countries. Symmetrical relationships can be also inferred for inward FDI and trade as summarised in the lower portion of Table 2-2.

Table 2- 2 The Effects of FDI on Trade between Two Countries

FDI		Exports from A to B			Imports to A from B		
In production of	For market of	E	M	G	E	M	G
Outward FDI: from A to B							
S	B	≥0	≥0	≥0	≥0	≥0	≥0
F	A	≥0	≥0	0	≥0	≤0	≥0
	B	≥0	≥0	≤0	0	≤0	0
	C	≥0	≥0	0	0	≤0	0
m	A	≥0	≥0	≥0	0	≥0	0
	B	≥0	≥0	0	0	0	0
	C	≥0	≥0	0	0	0	0
Inward FDI: from B to A							
S	B	≥0	≥0	≥0	≥0	≥0	≥0
F	B	≥0	≤0	≥0	≥0	≥0	0
	A	0	≤0	0	≥0	≥0	≤0
	C	0	≤0	0	≥0	≥0	0
m	B	0	≥0	0	≥0	≥0	≥0
	A	0	0	0	≥0	≥0	0
	C	0	0	0	≥0	≥0	0

Source: Lin, Weltwirtschaftliches Archiv Review of World Economics, 1995, p.739.

Notes: S is services; F is final goods; m is materials including parts; E is equipment and machinery; M is materials; and G is other goods.

In short, the above explanation suggests that the impact of FDI on bilateral trade can be positive or negative depending on what the final outcome is.

Though, it is very rare to find the study about relationship between FDI and imports, there are many theoretical arguments to the substitution and complementarily hypothesis of FDI and exports. Some examples are as following.

Mundell (1957) analysed a 2 x 2 x 2 Hechscher-Ohlin economy with distortions arising from tariffs. He noted that in this model it would be the relatively low-priced factor in each country that will be abundant. Furthermore, he showed that factor mobility, created by international factor price differentials, substitutes for good trade and leads to the elimination of international price differentials on the goods market, as well as on the factor markets, and to relative prices which are identical to those of a free trade equilibrium with immobile factors.

Jones (1967) demonstrated that tariffs imply a reduction of the volume of trade at constant terms of trade and therefore reduces national income (volume of trade effect). At constant terms of trade, tariff-generated capital movements, therefore, also reduce income.

On the other hand, many argue a complementary relationship, i.e., a positive causal link between FDI and exports. Markusen (1983) demonstrates that factor movements and goods trade are complements in the volume of trade sense if the basis of trade is not a difference in relative factor endowments. In the case of different production technologies, distortions in product or factor markets, external economies of scale (but equal factor proportions), factor mobility generates differences in factor proportions and therefore an additional basis for goods trade. Monopoly in one country as a basis for trade, together with competitive factor markets, for example, implies differences in factor prices.

Factor mobility therefore results in an inflow of the factor used intensively in production and enlarges the volume of trade (Markusen, 1983).

Theoretical arguments that support the reverse causality from exports to FDI are scarce. It can be argued that foreign production and home production are characterised by different costs (Buckley and Casson, 1981). The cost function of foreign production contains higher fixed costs but lower variable costs than home production. This implies that in periods of growing market share a point in time exists at which it is efficient to switch from exports to foreign production. *"The only firm prediction that can be made is that in an expanding market... FDI will never precede exporting"* (Buckley and Casson, 1981, p.81). Aggregating over all firms, this can lead to the empirical implication that exports should cause FDI.

This short summary of arguments shows that there is no distinct theoretical answer to the substitution/complementarily hypothesis of the FDI-exports relationship.

2.5.3 Transfer of Technology and Labour Training

The role of FDI in the transfer of technology is now a main issue with regard to the development of industrial technology in developing countries. When foreign firms transfer personnel and capital goods abroad, techniques of various sorts are made available for increasing productivity in the host countries. The transmission of a package of managerial skills, and of technical knowledge, is one of the characteristics of FDI.

Foreign firms have provided the host countries with many benefits in the form of knowledge of well established processes and techniques, and of modern equipment, labour training, management, modern organisation, and also the research, which is continuously carried on by foreign firms. Research is the

keystone of growth providing both the new products and the new techniques that raise industrial productivity (Mikesell, 1962).

Besides these, the presence of foreign technology will stimulate the host countries to do research and to develop theirs own technology more rapidly than they would. Nevertheless, there are several problems of technology transfer, such as the unwillingness of foreign firms to disseminate their knowledge to other business firms and the failure of the host countries to create an environment favourable to technology transfer.

Some techniques may be irrelevant and sometimes harmful to the developing countries, as they are based on the factor proportions of the rich countries and not on those of the developing countries. The transfer of technology may, therefore, lead to capital intensive production methods and hence less additional employment opportunities than would have been possible if the techniques developed had been based on the factor proportions pertaining in the developing countries. Thus, the developing countries should select techniques appropriate to their endowments and national objectives and also try to improve the environment to favour technology transfer.

On the whole, domestic labour can improve the technical skills of domestic labour through various programmes in foreign firms, such as job training programmes offered by business firms. Several foreign firms have also sent domestic workers to attend courses in technology and management abroad. Some were sent directly to work in factories abroad to acquire particular technical skills. Thus, foreign investment provides training in new skills, and the knowledge gained by these workers can be transmitted to other members of the labour force.

2.5.4 Capital Stock and Resource Shifts

The addition to the productive capital resources of the host country is not measured simply by the outflow of capital from the investing country as profits are reinvested, but there is a substantial mobilisation of domestic capital as well. The transfer of personnel, new techniques, and skills from the parent firms also enhances the productivity of local capital.

One of the ways to measure the capital stock effect of FDI on the host country is to measure the percentage of FDI to the gross domestic capital of the host country (Intarathai, 1974). If these percentages are high, it represents that foreign investment plays an important role in domestic investment. However, these percentages are low, even though they concentrate in key industries of the host country.

The use of domestic raw materials is generally considered to be a desirable effect of FDI, since foreign enterprises usually invest in new areas of production in the modern large-scale enterprise, which makes possible the use of previously unutilised or under-utilised resources. As capital and technology move into a given industry in the host country, there is an additional demand for labour, materials and land, as well as for domestic capital funds. It creates more opportunity to use local capital, manpower, and resources efficiently. Otherwise, these resources might be used in a wasteful way, such as in real estate investment or consumption of luxury goods.

Even the use of relatively scarce domestic resources is beneficial, since the purchase of these resources by foreign firms will bid up the prices of these domestic materials and will promote higher incomes for some of the host country's nationals. However, this case is more controversial since the more of these scarce resources that foreign firms use, the less there will be left for domestic firms. This problem is particularly pronounced when foreign firms use their superior bargaining power to monopolise the use of these scarce resources (Tambunlertchai, 1975).

Nevertheless, these resources may be more productively used. And part of the productivity gain can be an addition to domestic income and can be transformed into the foreigners' profits. Thus the net effect to the host country would depend on how these productivity gains were distributed.

2.5.5 Market Structure

The impact of FDI on the market structure of the host country in which the products are sold may be altered in the direction of either greater competition or greater concentration. A move to greater competition would arise if the foreign firms were placed in an already established industry and were of the cost reducing type. Even though they were placed in an already established industry, they may also create more concentration if the foreign firms with their superior financing and technical status destroy previously established firms in that industry. If the resource transfers were for the introduction of a new product in an established industry, the results might well be a reduction in the sales of close substitutes made by others, leading to a concentration of production in the hands of the recipient company.

However, tendencies toward monopoly in the market may sometimes be strengthened by the procedure of licensing under patents and trademarks. The monopoly provided is a legal one and is extended for the purpose of encouraging invention and innovation as well as maintaining product quality. Monopolistic tendencies also arise from governmental inducements to the foreign investor, which provide either exclusive tax benefits or protection from import competition.

2.5.6 Empirical Findings

On the whole, inflows of FDI can have both positive and negative impacts on host country's economy. Hence, in order to detect the impacts of FDI flows, one has to be careful about the study period, characteristics of the host country,

and the type of FDI. For more comprehensive insights, recent empirical findings are discussed as follows.

Lin (1995) estimated the effect of Taiwan's outward FDI in a host country on exports to and imports from the host country and the trade effect of inward FDI from that country based on time series data. The countries considered are Indonesia, Malaysia, the Philippines, and Thailand. In his study, the statistical model used consists of the following export and import equations:

$$EX_t = a_1 + a_2 YH_t + a_3 PW_t + a_4 OI_t + a_5 COI_{t-1} + a_6 CII_{t-1} + u_t \quad \textbf{(2. 1)}$$

$$IM_t = b_1 + b_2 YT_t + b_3 PW_t + b_4 II_t + b_5 CII_{t-1} + b_6 COI_{t-1} + v_t \quad \textbf{(2. 2)}$$

where EX = Taiwan's real exports to country i,
IM = Taiwan's real imports from country i,
YH = real GDP of country i,
YT = real GDP of Taiwan,
PW = wholesale price ratio between Taiwan and country i,
OI = Taiwan's real outward FDI to country i,
II = Taiwan's real inward FDI from country i,
COI = cumulative OI,
CII = cumulative II,
u, v = error terms,
t = year.

The regression results show that Taiwan's outward FDI has a significant positive effect on exports and imports from the host country, whereas no such effects were consistently found for inward FDI from the same country.

Orr (1991), Blomstrom et al (1988), and Pfaffermayr (1994) have examined the effect of FDI on exports. Orr himself examined the trade balance effects of inward FDI to the US. He suggests that FDI improves the competitiveness of US firms in both international and US markets. He finds an elasticity of US

aggregate exports to FDI of 0.21, which suggests that FDI in the US during the late 1980s raised US exports by roughly 20 billion dollars over the long term.

Orr hypothesised that inward FDI should lead to lower US imports, but, empirically, an increase in FDI appears to raise aggregate imports even after several years. However, this finding does not hold up at the industry level. For example, Orr finds that FDI in the US auto industry initially raised the trade deficit as imports of capital goods and parts offset the reduction in imports of finished automobiles. However, after four years, FDI led to a trade surplus in automobiles as imports of capital goods and parts fell, and domestic content rose.

Orr's findings suggest that US FDI in Mexico may initially raise US exports and improve the US trade balance. However, Mexico's imports of US goods may eventually fall and US imports from Mexico may eventually rise. Total US exports could rise if the US parent would ship inputs to Mexico for final assembly before shipment back to the US, and if lower production costs in Mexico create a larger US market for the goods than would otherwise exist.

Wilamoski and Tinkler (1999) estimate the trade balance effects of FDI with the hypothesis of "how does US FDI in Mexico affect trade?" Aggregate trade and trade between US MNEs and their Mexican affiliates are both examined using annual data, from 1977 to 1994, and classical regression analysis. The following model is estimated with all variables expressed as logarithms and in real terms:

$$X_t = x_1 + x_2 Y_{t,mex} + x_3 R_t + x_4 FDI_t + x_5 \sum CFDI_{t-1} + u_t , \qquad (2.3)$$

$$M_t = m_1 + m_2 Y_{t,us} + m_3 R_t + m_4 \sum CFDI_{t-1} + u_t , \qquad (2.4)$$

where X_t is an US-manufactured export to Mexico;

M_t is an US-manufactured import from Mexico;

$Y_{t,i}$ is gross domestic product (i is country);

R_t is real exchange rate;

FDI_t is US FDI in Mexico in year t; and

$CFDI_t$ is cumulative US FDI in Mexico to year t.

Their findings suggest that FDI will eventually lower US exports as Mexican content rises. The results for imports indicate that US FDI to Mexico will raise US imports. The results for aggregate exports and imports indicate that the net trade balance effect of FDI between the US and Mexico is slightly positive.

In addition, these estimates, as well as those of Orr (1991), Blomstrom et al. (1988), and Lin (1995), were obtained by estimating conventional trade models without considering the stationarity properties of the relevant time series. If the variables are not stationary, this method will generate spurious results, that is, test statistics that are biased toward finding significant relationships that do not exist. To overcome this problem, Pfaffermayr (1994) examined the relationship between FDI and Austrian exports using vector autoregression (VAR) analysis.

In his study, Pfaffermayr used the impulse response and the variance decomposition analyses to measure the speed and strength with which one variable responds to shocks arising from another variable. These innovative accounting techniques show a very slow dynamic response of both Austrian foreign outward direct investment and exports to exogenous shocks of the other. Furthermore, it indicates the possibility of a positive effect of exogenously increased FDI on exports and a negative effect of export shocks on FDI; however, significant long run effects are not established. By following Pfaffermayr's approach, the VAR analysis is also applied in this study.

Ngosirimanee (1982) investigated the impact of foreign capital on saving and economic growth in Thailand. In his analysis, he employs the comparative static model and applies the two-stage least squares (2SLS) technique. In the study period (1960-1981), he found that FDI discouraged private saving, gross national saving and economic growth enormously, but they had no effect on

public saving. However, he suggested that these effects existed in the short run due to the comparative static approach. The long-run effects of FDI may be different if the long-run dynamic model is employed.

Schive and Tu (1991) examined the direct and indirect effects of FDI on aggregate investment, consumption, exports, and imports in Taiwan. In order to sort out these effects, a four-equation model of such macroeconomic variables is developed. Their model is estimated by the three-stage least squares (3SLS) for the 1958-1987 period. The results of the model indicate that there is a significantly positive influence of FDI flows on total investment. The resulting coefficient of 2.84 means that each NT$1 of FDI has induced NT$1.84 of investment. In contrast, FDI flows apparently had no effect on consumption other than that imparted indirectly through income creation.

To the extent of trade effect, the stock of FDI is found to be a significantly positive determinant of exports. When compared with survey data, the regression coefficient suggests that FDI flows impart positive indirect effects on exports, which are not reflected in the survey data. On the import side, FDI stock contracted total import, but the coefficient was only weakly significant. However, both imports and consumption expenditure are indirectly stimulated by income creation, which results from investment, and export stimulation. Hence, it should be noted that these results hold even after accounting for feedback among the variables in the model.

Zhang and Felmingham (1998) investigate the international influences on China's recent growth as the remarkable growth of the People's Republic of China (PRC) has attracted the interests of many researchers. Annual data for the years 1971 to 1996 is used and the countries in the study's interest are Australia, Singapore, Hong Kong, Taiwan, and the G7 nations (the US, Japan, Germany, France, Italy, the UK, and Canada). A single equation is developed in order to examine the long-run relationship between China's real GDP, the FDI in China; China's aggregate export values and the exchange rate. The

empirical results show that the growth of the PRC is not closely linked with the growth of the developed economies such as G7 nor Australia and Singapore. In contrast, it is clear that the PRC's growth rate is linked to the two China's outside the PRC, namely, Taiwan and Hong Kong. The independence of China's growth is explained partly by the radical reforms associated with "open door policy". The growth of China since the door was opened has been uneven across individual provinces, but the outstanding characteristic of this growth is the importance of FDI in each province. By Granger's causality test, Zhang and Felmingham find that FDI causes an increase of exports.

Tian and Shan (1999) set a hypothesis of "does foreign direct investment lead growth" and use Shanghai as a case study. They carry out the tests on monthly time series data for the period of 1990 to 1996. The VAR system is constructed upon six variables, i.e., exports, GDP, the total persons employed, imports, FDI, and gross fixed capital expenditure. The results indicate a two-way causality running between GDP and FDI for Shanghai. The results reported can not offer the support, in the sense of an undirectional causality ordering, for the FDI-led growth hypothesis. The implication of this two-way causality is that the efforts of promoting further economic growth using a set of well-designed domestic policies is no less important as replying on FDI inflows.

To study the impacts of FDI on the development of the Thai economy between 1960 and 1989, Traiwannakij (1992) constructed a macroeconometric model consisting of the agricultural and non-agricultural sectors. He did not choose an aggregate model because he wanted to reflect several vital social and economic distinctions in the Thai economy. In his study, the two-stage least squares (2SLS) technique is applied in main components of equations. Consequently, the dynamic multipliers performed under the simulation method indicate that FDI inflows have no impact on the export of agricultural products, the consumption expenditure for agricultural products, and the import of agricultural products.

From Traiwannakij's model, FDI inflows cause labour mobility from the agricultural sector to the non-agricultural sector. As a result, agricultural output declines. In contrast, FDI stimulates the production and export of non-agricultural products; it accelerates total investment although domestic private investment is discouraged. The expansion of non-agricultural output stimulates the gross domestic product and then disposable income, the consumption expenditure for non-agricultural products, and the import of consumer goods. At the same time, the deficit trade balance would be improved in the long run owing to the fact that the long-run multiplier of the total export of goods and services is greater than that of the total import of goods and services. Also, the balance of payments is better in the long run because of the decline in the trade deficit and the income remitted abroad.

However, his work classifies total investment into domestic private investment, domestic government investment, and net foreign direct investment. Moreover, domestic private investment and exports of non-agricultural products are not determined by net foreign direct investment although they should be.

In order to examine the differential impacts of FDI on developing countries, Fry (1993) formulated a macroeconomic model of foreign direct investment. His model, using the ratio or rate formulation in the dependent variables, is composed of five behavioural equations, i.e. domestic investment, national saving, imports, exports, and growth rate of income. Sixteen developing countries tested by Fry are Argentina, Brazil, Chile, Egypt, India, Indonesia, South Korea, Malaysia, Mexico, Nigeria, Pakistan, Philippines, Sri Lanka, Thailand, Turkey, and Venezuela. The estimation period is 1966-1988 except for Brazil (1966-1985), Chile (1966-1984), Indonesia (1967-1988), and Pakistan (1968-1988). So that the results hold, even after accounting for feedback among the variables in the model, the regression method applied in his study is the three-stage least squares (3SLS). The model formulated by Fry (1993)

emphasised not only the direct and indirect effects of FDI on important macro-variables, but also the short-run and long-run effects of FDI on such variables.

The sixteen-country sample has different structures in terms of economies and forms of FDI. Furthermore, these different forms of FDI can have different effects on a country's rate of economic growth. As a result, Fry investigated the differential impact of FDI among countries by dividing the sample into one group consisting of Southeast Asian developing economies (Indonesia, South Korea, Malaysia, Philippines, and Thailand) and the remaining eleven countries in a control group, and interacting the FDI variable with factors that seem likely to affect productivity.

The results showed that the impacts of FDI inflows vary significantly between two classified groups of developing countries. For eleven countries outside Southeast Asia, FDI appears to have been used in large part as a substitute for other types of foreign flows; it has not increased aggregate domestic investment. When the control group countries attracted more FDI inflows, domestic investment, national saving, and the rate of economic growth all declined.

Hence, FDI appears to have been an influential factor in these countries. In contrast, inflows of FDI in Southeast Asia raise domestic investment by the full extent of the FDI inflow. Therefore, in these countries, FDI has not been used as a substitute for other types of capital inflows but has increased capital formation and so worsened the current account.

By increasing domestic investment in these countries, FDI has increased growth rates. Moreover, Fry (1993) pointed out that financial repression and trade distortion could both cause FDI to be immiserising as in the case of the control group economies. He showed that FDI enhanced the rate of economic growth in the absence of financial repression and trade distortions.

On the whole, the major findings are that in the short run FDI harms the macroeconomy, but in the long run FDI benefits these developing economies. In other words, the contemporaneous FDI mostly discourages domestic investment, national saving, and exports of the sample; but the lagged FDI improves the present domestic investment, national saving, the rate of economic growth, and the balance of payments on the current account.

A more recent study by Jansen (1995) explored the macroeconomic effects of FDI in Thailand between 1970 and 1991. He used simultaneous equations and the stimulation method to examine the impacts of FDI and foreign portfolio investment (FPI) flows on the Thai economy, in particular on its balance of payments and on the rate of investment and growth. His model consisted of ten behavioural equations (such as private investment, private saving, capacity output growth, imports, and exports) and nineteen identities to explain twenty-nine endogenous variables. The model is estimated econometrically and then used for dynamic simulations for 1987-1991, which is the period when FDI increased sharply.

The counterfactual simulations with the macroeconomic model identified that the sharp rise in FDI flows during 1978-1991 caused increases in private investment, export, and economic growth. In addition, there was no evidence for any crowding out of local investment by FDI. However, FDI induced investments were highly import-intensive and also led to higher investment income payments. Therefore, the net result was that the widened current account deficit rose substantially more than the increase in FDI inflows.

The results by Jansen (1995) also identified that an increase in FPI flows, which was mainly felt on the stock market, had a positive impact on the stock of private wealth. This increase in private wealth generated a higher level of private consumption and saving, which in turn led to higher growth. FPI flows had no impact on exports, but stimulated imports due to the higher level of consumption and income, and hence the current account deficit was widened.

The deterioration of the current account was, however, smaller than the increase in FPI inflows, so that, on balance, the need for external borrowing declined and the foreign debt burden fell. Jansen (1995), therefore, concluded that FPI flows were more non-debt creating capital flows than FDI flows.

Additionally, he noticed that these impacts of the increases in FDI and FPI flows were partly influenced by ongoing public sector financial reforms. The decline in public investment and the disappearance of the public sector-borrowing requirement made the private sector investment boom possible, without too many tensions on financial, commodity and factor markets.

According to Jansen (1995), export-oriented FDI in Thailand is likely to have a positive effect on private investment and growth but can have an adverse balance of payment effect. However, in his model, FDI variable is defined as an exogenous variable, which should be at least specified by some fundamental variables.

Apart from the macro-model approach used by the preceding study, a recent work about macroeconomic analysis of FDI done by Tran Van Hoa (1993) uses cointegration analysis. He used Thai quarterly data from the fourth quarter of 1975 to the fourth quarter of 1990 to examine the long-run relationship among the important macroeconomic variables, i.e., FDI, external debts, GDP, and inflation. In his study, he generates and tests two equations that express the relationship between GDP and FDI and external debts. The other is the one showing the relationship between inflation and FDI and external debts.

Within the study period, the results of the Dickey-Fuller test stated that all four variables in his study were non random-walk variables. Applying the cointegration test, he found that in the long-run GDP would move together with FDI and external debts. In addition, no statistically significant long-run relationship between inflation and FDI and external debts was found. His

findings, therefore, indicated that economic growth had the opposite direction from the inflation rate.

He also concluded that FDI and external debts were favourable policies to stimulate economic growth in Thailand, according to his study period, since they did not cause the inflationary pressure.

Table 2- 3 Studies of Macroeconomic Impact of FDI, using Thailand as a study case

Author	Study Period	Objectives	Method	Results
Jansen (1995)	Annual data 1970-1991	Examine the impacts of FDI and FPI flows on BOP, rate of I, and YG.	Simultaneous equations and simulation method.	FDI leads to increase in DPI, X, and YG. No evidence for any crowding out of DPI by FDI.
Tran Van Hoa (1993)	Quarterly data 1975-1990	Examine the long-run relationship among the important macroeconomic variables, i.e. FDI, external debts, GDP, and inflation.	Cointegration Analysis. Dickey-Fuller Sargan-Bhagavan	The long-run GDP would move together with FDI and external debts. No statistically significant long-run relationship between inflation and FDI and external debts was found.
This study	*Annual data 1965-1997*	*Examine the impacts of FDI flows on DPI, M, and X.*	*Cointegration Analysis ARDL VAR*	*See Chapter 5*

FDI is foreign direct investment

FPI is foreign portfolio investment

BOP is balance of payment

I is investment

YG is growth

DPI is domestic private investment

M is import

X is export

Table 2-3 summarises the studies of macroeconomic impacts of FDI on the Thai economy. Although they are similar in the objectives, this study uses a longer cover period of investigation (33 years) with a slight difference in methodology. This might give us results that differ from others.

2.6 Summary

In this chapter, along with explanations of the various types of FDI, a review of the literature on theoretical approach to determinants of FDI and macroeconomic impacts of FDI has been outlined. Some important theories are briefly surveyed, especially the theories in trade-theoretic approach. Moreover, some empirical evidence of the macroeconomic impact of FDI are also presented.

Generally speaking, research or the study method can be divided into two groups - qualitative analysis and quantitative analysis. Qualitative analysis is a research method that uses surveys or questionnaires as sources of data, and has the advantage that we know about the reasons and characteristics of FDI. Quantitative analysis, however, uses econometrics to help in describing rather than surveying. The differences between these two groups show that the econometrics method is a useful tool to use in determining causality and quantifying economic relationships. This is the reason why all the studies quoted in this study are investigated by the quantitative analysis method.

Besides, as already mentioned, FDI inflows affect the host economy in many ways; many studies have already explored the impact of FDI inflows on the economy's growth and development, employment, and market structure. But there are not many studies of the impact of FDI on the economy's trade and domestic private investment, which are two important sectors of a particular economy.

It is therefore of interest to undertake such a study on the effects of FDI on an economy's trade and domestic private investment by using the econometric method.

We have looked at various models for investigating the impact of FDI on a country's economy. Every economy is different. Effect of FDI various

depending on structural characteristics of a particular economy. Next chapter, we look at Thailand for the topic of this term.

CHAPTER 3
OVERVIEW OF FDI IN THE THAI ECONOMY

3.1 Introduction

The purpose of this chapter is to provide an overview of Thailand's economy with particular focus on FDI. The chapter begins with a brief introduction about Thailand, in section two. Section three highlights macroeconomic features and structural formatted of the Thai Economy. This is followed by a review of FDI in terms of its role, which is shown in section four. A discussion of FDI trend and pattern over the past three decades is presented in section five. Next, in section six, a preface about the Board of Investment and Promotional Measures for foreign investment is offered. Finally, a summary of the chapter is displayed in section seven.

3.2 Thailand at a Glance

Thailand, previously known to Westerners as Siam, is located at the very centre of mainland Southeast Asia, and its capital, Bangkok, has become the transportation hub of the region. The country is 198,000 square miles (NSO, 1997) in area, approximately the same size as France. Its shape has been linked to an orchid or an elephant's head, with the long strip running down the Malay peninsular representing the stalk or trunk as the case may be. Thailand lies wholly in the tropics, and thus has warm weather all year round (BOI).

The population of Thailand now stands at about 61 million (NSO, 1999), and in spite of a high growth rate, the population density is still low with an annual growth rate of 1.7% over the last two decades (World Bank, 1999). The capital, Bangkok, has 6 million inhabitants (MFA, 2000). Approximately 75 percent of the nation are still engaged in farming, forestry, and fishing, although migration to the towns accelerates as industrialisation proceeds. Eighty-five

percent of the people are classed as Thai, and 12 percent as Chinese. The remainder are of Malay, Khmer, or Indian blood, with a growing group of hill-tribe people (Meo, Yao, Lisu, Karen, etc.) in the northern mountains (NSO, 1997).

About 95 percent of the people are Buddhist, 3.9 percent are Muslim, which minority concentrated in four southern provinces. About 0.5 percent of the people belongs to various Christian sects and 0.6 percent for other religions (MFA, 2000). The official language is Thai. The written scripts are also formidable as the alphabet contains 44 consonants and 28 vowels.

Thailand is a constitutional monarchy. Head of the state is His Majesty King Bhumiphol Adulyadej, who is held in the utmost esteem by the whole nation.

3.3 Background of the Thai Economy

The Thai economy was dramatically opened to the West in 1855 when a representative of Great Britain, Sir John Bowring, and King Rama IV of Thailand signed the Bowring Treaty (Prajuntaboribal, 1993). Consequently, the Thai economy became a dependent economy. Production was specialised, and only a few primary commodities such as rice, tin, teak, and rubber were produced to serve foreign demand. While imports were composed of a wide range of manufactured products especially textiles.

A long time after the treaty, in the 1960s, Thailand started to modernise her developing economy. Based on suggestions from the World Bank, the government shifted its emphasis to promote private investment. A lot more basic infrastructure was provided with the help of foreign aid. Internationally, the strategy of import substitution was precisely set out in the First and the Second National Development Plans, during 1961-1966 and 1967-1971 respectively. Although the domestic manufacturing sector expanded rapidly in this decade because of tariff protection and investment incentives, it made a

rather insignificant contribution to exports. Exports were still composed of a narrow range of primary commodities. By the end of the 1960s, the problem of deficits in the balance of payments was very serious. The high level of machinery and raw material importation and the stagnation of primary exports were the main causes of this.

In order to eliminate the problems resulting from the import substitution strategy, an export promotion policy was outlined in the Third and the Fourth National Development Plans in the 1970s. The outward-looking strategy caused a large increase in export value and diversification. However, the increase in public foreign debt and government intervention was not favourable for the economy in this decade.

Most of the government policies have been changed since the 1980s. Policies, such as the internationalisation and liberalisation of trade, devaluation and the introduction of a more flexible exchange rate of the Thai currency, the privatisation of inefficient state-owned enterprises, and the relaxation of investment conditions have led the Thai economy toward a more industralised structure. By 1990, the service sector had become the dominant sector of production at 48.4 percent of GDP, followed by industry at 39.2 percent, which left the rest of the 12.4 percent to agriculture. Table 3-1 and Figure 3-1 show the change in the structure of the Thai economy.

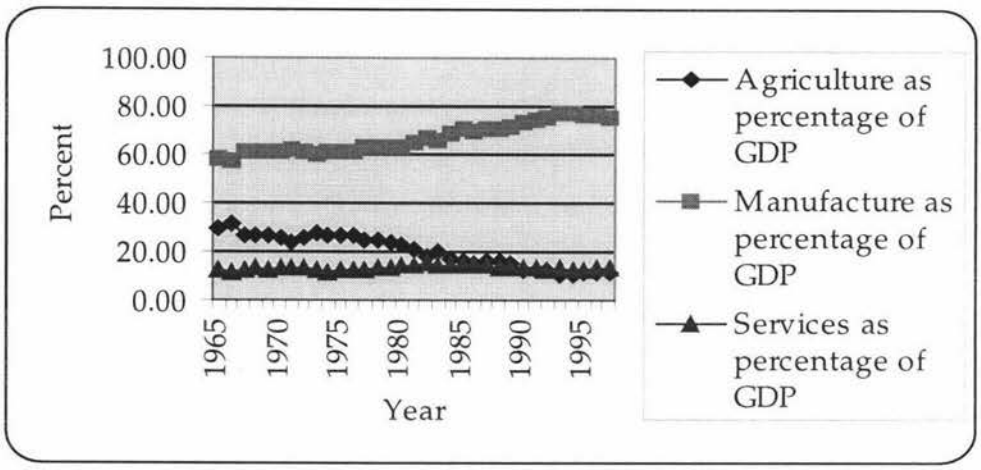
Table 3- 1 Structural Transformation in Thailand, 1960-1990

Year	Sectoral share of GDP		
	Agriculture	Industrial	Services
1960	39.8	18.6	41.7
1970	25.9	25.3	48.8
1980	23.2	31.0	45.8
1990	12.4	39.2	48.4

Source: Sited by the ASEAN Region in Transition: A Socioeconomic Perspective, p.112.

The importation of capital goods was still high, however, but the growth of exports, particularly in manufactured goods, had markedly increased. At the same time, there was an increase in FDI, especially from the late 1980s and the early 1990s. This significantly contributed to the large capital inflows in the balance of payments in place of the former foreign debts.

Figure 3- 1 Industries' share in GDP, in Thailand, 1965-1997



Source: data extracted from Appendix A, Table A-2

Table 3- 2 Growth of GDP of Southeast Asian Countries, 1973-1993

(Percent)

Countries	Growth Rate of GDP				
	1973	1978	1983	1988	1993
Brunei	-	6.8	0.79	1.93	0.49
Cambodia	-	-	-	12.36	5.1
Indonesia	8.7	7.7	8.9	5.8	6.3
Laos	-	0.90	2.10	-2.1	5.9
Malaysia	11.9	6.8	6.4	8.9	8.5
Myanmar	0.4	6.5	4.4	-11.5	5.8
Philippines	8.8	5.1	1.8	6.8	2.0
Singapore	11.46	8.58	8.13	11.65	10.37
Thailand	**10.3**	**10.4**	**5.5**	**13.3**	**7.8**
Vietnam	-	-	-	5.13	8.07

Source: World Bank

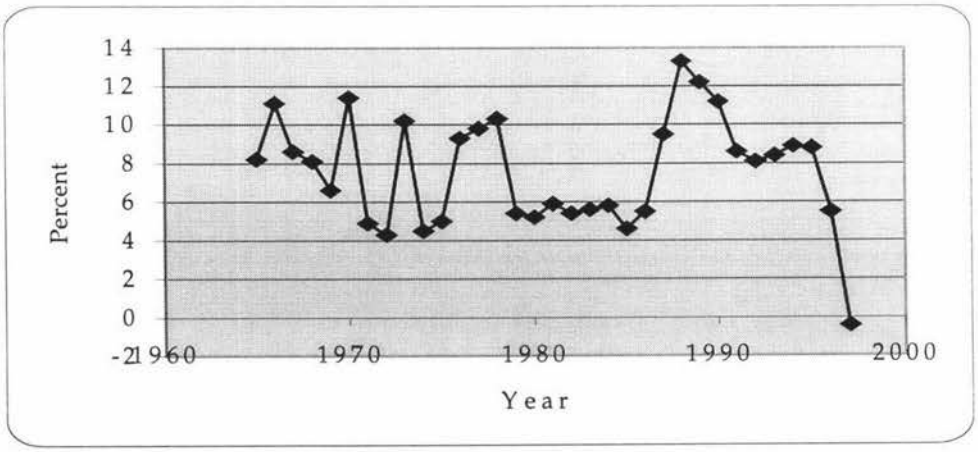
In brief, since the 1970s, when Thailand emphasised an outward-looking strategy, her structure of production has changed into a more industrialised economy. The Thai economy has also been able to maintain a higher growth

rate than other neighbouring countries (Table 3-2) with the help of a large increase in exports, particularly in manufactured goods.

Domestic savings, however, are still not adequate to support the desired high rate of investment. The country's dependence on foreign savings is needed to fill the gap between domestic savings and investment. Up to 1990 while domestic savings increased at a diminishing rate, foreign savings increased, from 3.7 percent of GDP in the previous year, to 8.6 percent of GDP in 1990.

As mentioned by the World Bank, Thailand is ranked first in the world for achieving an average per capita GNP growth of 8.2 percent per year from the mid 1980s to the mid 1990s. However, following this the economy began to slow down and got worse in 1997 with a GDP growth at –0.4 percent (Figure 3-2). According to the Bank of Thailand (1999), economic growth in 1997 declined as the economy adjusted to the baht floatation policy. The currency float is anticipated to boost capital inflows and exports while decreasing the current account deficit.

Figure 3- 2 GDP Growth Rate, 1965-1997



Source: data extracted from Appendix A, Table A-3

Currently, the IMF is advising Thailand's policy-makers as they make the adjustments necessary to ensure sustainable growth over the long-term. Three

key concerns include rising inflation, a stubbornly high current account deficit, and a sluggish export growth (BOI, 1997).

In addition, there are three underlying factors, which will significantly affect Thailand's future growth. First, the industrial sector will increasingly deepen and provide for the growth of supporting industries and services. Second, moves towards economic decentralization and the development of Thailand's outlying provinces will be facilitated. Third, regional economic integration and globalised production capacities will be expanded.

Present macroeconomic policy initiatives reflect the Thai government's readiness to focus on these issues. First, the government is enforcing a mix of tight monetary and fiscal policy measures. Second, the widening investment-savings gap is being addressed by encouraging higher household savings, and more selective investment through budget cuts and efficiency measures. Third, the government is focusing on building institutional capacity to manage more sustainable economic growth and growing economic interdependence. Finally, regulatory frameworks are being strengthened to restrain the volatility of capital flows.

3.4 The Role of Foreign Investment

Industrialisation in Thailand cannot be achieved rapidly because the country suffers from a shortage of capital, technological knowledge, and managerial skills. Therefore, one of the ways to foster industrialisation is to welcome private foreign investment. The government has permitted the attraction of foreign capital, management, and technology.

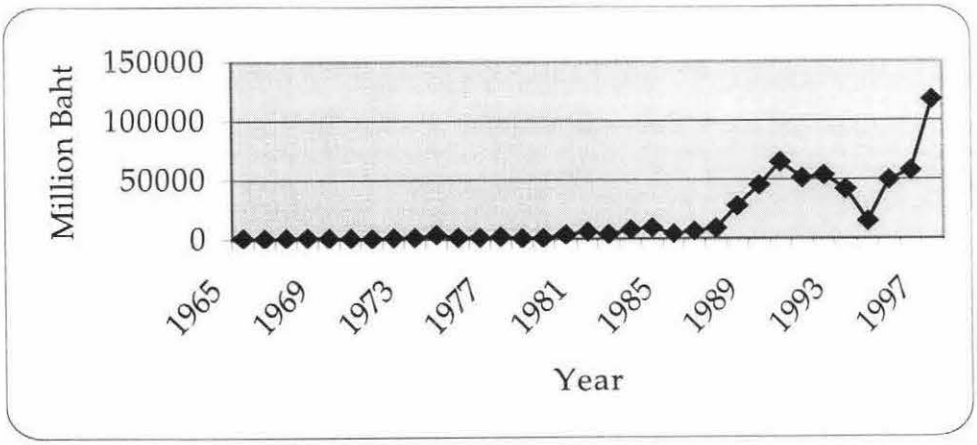
Before the Second World War, FDI was concentrated mostly in the tin mining, rubber plantations, the teak industry, and certain small trades. James C. Ingram (1971) stated that the first inflow of western capital came in during the last decade of the nineteenth century when the first Australian firm came to operate

the tin mining in 1907. This was followed by European companies working on a teak forest in the northern part of Thailand in 1924. Most of the foreign capital at that time came from Great Britain, the Netherlands, and France. But the exact percentage of capital attributable to each country cannot be calculated.

Besides these, Intarathai (1974) indicated that the Chinese also engaged in a variety of commerce, such as retailing, agricultural trade, and import-export trade. Foreign investment by the Chinese, however, was quite different from that of the Westerners in that - they did not bring in capital and skills as much as the Westerners did. Most of them lived in Thailand permanently and did not remit abroad foreign currency derived from their investment.

Nevertheless, the Second World War stopped the inflow of foreign investment completely and it was not resumed again until 1956. Since then, the FDI has slowly been on the increase before started accelerated at the end of 1980s (Figure 3-3).

Figure 3- 3 Net FDI Inflows in Thailand, 1965-1997



Source: data extracted from Appendix A, Table A-1

One of the major reasons behind the industrial growth in Thailand is the active response of foreign investors to the Investment Incentive Programme first launched by the government in 1959. Although capital participation from

external sources has accounted for only one third of total equity investment, its relative contribution is much greater in terms of industrial technology, labour skill improvement and managerial know how. This is evident in many leading manufacturing industries. The industrial sector of Thailand has also relied on the external credit for financing its capital requirements. Much of this comes in the form of suppliers' credit on machinery and equipment.

Up to now, there are over 20 different foreign countries taking part in the industrial development in Thailand. The leading investing nations are Japan, The United States, and the ASEAN NIEs (newly industrialising economies). Most foreign investment in the promoted industries has taken place in the form of joint ventures. The present policy is to encourage more of the joint ventures since a joint venture basis is likely to be more stable and more lasting.

3.5 Trend and Pattern of FDI in Thailand

Since Thailand started the First Economic and Social Development Plan and founded the Board of Investment, there has been a significant upsurge of inward FDI in Thailand. Table 3-3 provides a historical perspective of inward FDI inflows since 1970.

From the components of FDI inflows, it can be seen that the share of foreign equity inflows went up and down over the period under investigation. And most FDI outflows are in the form of foreign direct loans.

Table 3- 3 Net Flows of Foreign Direct Investment in Thailand, 1970-1994

Unit: Million Baht

Year	Foreign Equity			Foreign Direct Loans			Net FDI
	Inflow	Outflow	Net	Inflow	Outflow	Net	Inflow
1970	685.3	23.7	661.6	328.8	99.9	228.9	890.5
1971	793.1	101.1	692.0	234.7	118.3	116.4	808.4
1972	1165.7	11.0	1154.7	388.2	115.8	272.4	1427.1
1973	1408.8	33.0	1375.8	763.2	534.1	229.1	1604.9
1974	3026.3	289.0	2737.3	1657.1	558.0	1099.1	3836.4
1975	1654.1	358.0	1296.1	1737.3	1288.6	448.7	1744.8
1976	1565.5	238.7	1326.8	1498.4	1211.1	287.3	1614.1
1977	1325.4	209.2	1116.2	2960.7	1913.0	1047.7	2163.9
1978	1111.9	303.1	808.8	5253.0	4927.0	326.0	1134.8
1979	1412.7	147.8	1264.9	4586.8	4724.2	-137.4	1127.5
1970-1979	1411.9	171.5	1243.4	1940.8	1549.0	391.8	1653.2
1980	3703.8	132.7	3571.1	5555.2	5248.1	307.1	3878.2
1981	4127.2	78.9	4048.3	5214.6	2848.5	2366.1	6414.4
1982	3827.5	448.8	3378.7	5712.5	4759.8	952.7	4331.4
1983	7255.4	393.3	6862.1	6688.8	5326.0	1362.8	8224.9
1984	7612.5	467.6	7144.9	9357.7	6859.0	2498.7	9643.6
1985	6339.9	890.6	5449.3	3826.5	4834.0	-1007.5	4441.8
1986	6304.5	468.8	5835.7	4221.1	3148.7	1072.4	6908.1
1987	10621	373.2	10247.8	1915.0	3119.0	-1204	9043.8
1988	23065.9	285.7	22780.2	9671.9	4488.6	5183.3	27963.5
1989	38250.4	842.5	37407.9	14828.9	6539.3	8289.6	45697.5
1980-1989	11110.8	438.2	10672.6	6699.2	4717.1	1982.1	12654.7
1990	45186.7	2186.9	42999.8	32079.7	10384.5	21695.2	64695.0
1991	37755.1	2223.6	35531.5	56179.5	40321.9	15857.6	51389.1
1992	46344.6	3559.3	42785.3	80549.4	69570.4	10979.0	53764.3
1993	38706.1	7572.8	31133.3	123019.5	112278.8	10740.7	41874.0
1994	32802.8	7988.5	24814.3	116701.8	126562.5	-9860.7	14953.6
1995	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	49887.0
1996	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	57472.0
1997	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	117689.0
1990-1997	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	56465.5

Source: Bank of Thailand

According to Table 3-3, FDI inflows have shown an upward trend. The average annual values of net FDI are equal to 1,635 million baht for the 1970s, 12,655 million baht for the 1980s, and 56,465.50 million baht for the period of 1990 to 1997.

In the 1970s, net FDI inflow varied in the range of 808.4 to 3,836 million baht, which grew faster than ever since the start of FDI inflows. This huge increase of FDI was attracted by Thailand's industrialisation policy (import substitution

policy and export-oriented policy), and investment promotion. However, at the end of that decade, the amount of inward FDI declined due to Thai political instability. Frequent changes in government caused the stagnation of foreign investment. This can be inferred from the lower amounts of foreign equity inflow and net FDI inflow during 1978-1979.

For the 1980s, the average net FDI inflow was about eight times the level of the 1970s. However, in the first half of this decade, FDI in Thailand was rather small and fluctuated dramatically due to instability in both the domestic and world economies. FDI in Thailand started to expand at an exceptional pace after 1987, as the rising costs of production, especially labour costs and the appreciation of the currencies of Japan and the Asian NIEs' led to the relocation of their production bases to other economies, including Thailand. The flow of FDI into the country increased threefold from about 9,000 million baht in 1987 to about 28,000 million baht in 1988, reaching a peak in 1990 of about 65,000 million baht. Nonetheless, this trend slowly started to decline at the beginning of 1990s.

During 1990-1997, there existed a declining trend of net FDI. The underlying reasons affecting the decline in FDI are described as follows: Firstly, the continuing depressed economies of Thailand's major investor countries. The major home countries of FDI outflows (i.e. the United States (US), Japan, the United Kingdom (UK), Germany, and France, were continually faced with their own economic recessions. Therefore, the overall amount of FDI outflows in this specific period was lower. Hence, FDI inflows in Thailand also became relatively lower. Secondly, the shifting of foreign investment to other countries with lower production costs or larger domestic market bases, such as China and Vietnam. Lastly, the impact of the establishment of the Bangkok International Banking Facilities (BIBF), which accelerated markedly the repayments of loans to subsidiary companies with a view to shifting their sources of fund to BIBF.

Because of the above reasons, the Thai economy has still not recovered well. It grew at a slow pace as private consumption, private investment and industrial production slowed down, partially in response to the economic policies designed to reduce the pressure from high growth. An unexpected contributing factor was export growth, which was sharply reduced, contributing to slower growth in sectors other than manufacturing. In addition, the pursuit of strict monetary policy was introduced to control inflationary pressures and the current account deficit.

By FDI nationality classification, most FDI flowing into the Thai economy was traditionally from North America and Western Europe, more specifically from the US, UK, Germany, France, and the Netherlands. Japan emerged as a major investor in the 1960s and the Asian NIEs as major investors in the post 1987 period.

For the past three decades, Japan, Hong Kong, UK, Germany, and the European Union (EU) have held Thailand's major share of inward FDI. During the first two decades of the study period, from 1965 to 1984, the shares of these investing countries were relatively stable. US investment held the largest share (36 percent). Japan, EU, NIEs, and ASEAN follow this at 30 percent, 15 percent, 8 percent, and 5 percent in respectively. Figure 3-4 shows these proportions.

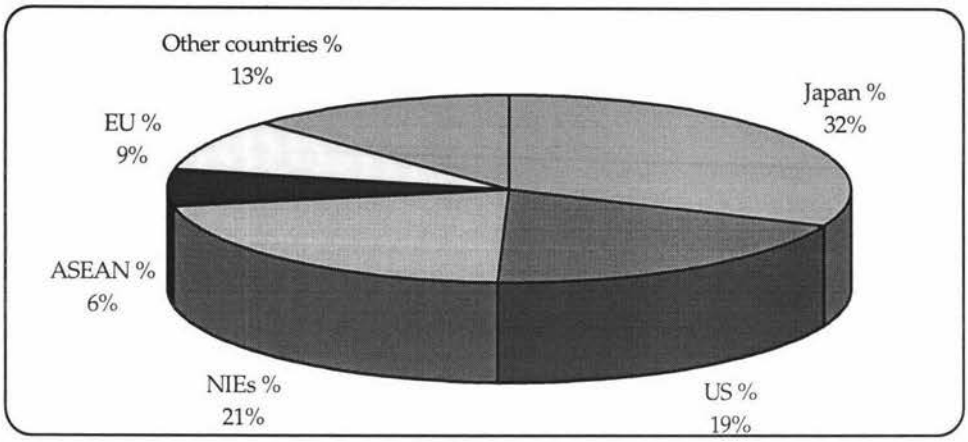
Nevertheless, the tripling of FDI inflows after 1987 and continued rapid growth represented a significant influx of new foreign investors. With the rapidly growing total, the rankings of Thailand's major investing countries were changed. From 1985 up to the present, Japan became the largest source of foreign investment (35 percent). The share of NIEs had grown to 21 percent while the US share had fallen to 19 percent. For EU and ASEAN, their shares had grown to 9 percent and 6 percent. Figure 3-5 shows the proportion of FDI inflow classified by country of origin during 1985-1997.

As shown in Figure 3-6, the sharp growth in the NIEs' share mostly came from Hong Kong and Taiwan. However, Taiwanese firms significantly increased their share of FDI in Thailand in the latter half of 1990s. In addition, historical data from the same table also indicate that Singapore has dominated the increase in the ASEAN share since 1973 and South Korea appears to be a newly rising investor.

According to economic classification, there were some shifts in sectoral allocation of foreign investments. In the period 1970-1984, FDI had concentrated on manufacturing, trade, construction, and mining and quarrying sectors (Figure 3-7). Nonetheless, the allocation pattern of the recent years shows some significant differences. The outstanding destinations are the trade, manufacturing, and services sectors. During 1985-1997, 40 percent of FDI was invested in manufacturing, 19 in trade, and 5 in services (see Figure 3-8).

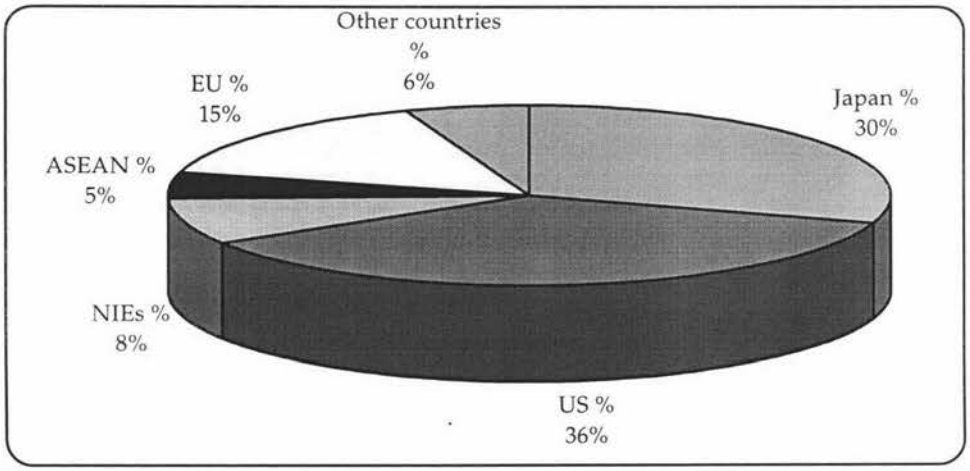
Investment in the manufacturing sector was made up as follows: between 1970 and 1984, textile (26%), electrical appliances (26%), chemicals (12%), petroleum products (11%), and machinery and transport equipment (7%). The distributions are shown in Figure 3-9. Between 1985 and 1997, investments in the manufacturing sector ranked as follows: electrical appliances (32%), chemicals (16%), metal and non-metallic products (9%), food (9%), and textiles (6%). These distributions are shown in Figure 3-10. This indicates intensive investment in the electrical appliances industry though investment in miscellaneous aspects of the manufacturing industry has also grown considerably.

Figure 3- 4 Distribution of FDI Inflow by Country of Origin, 1965-1984



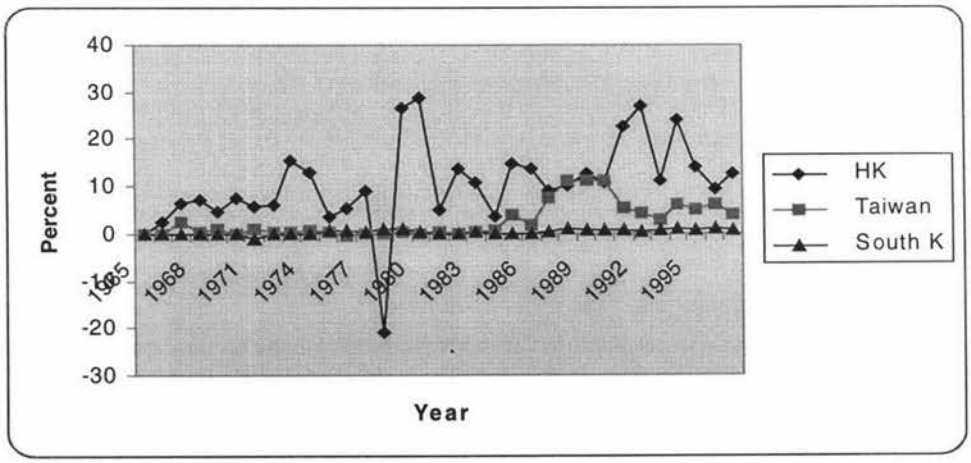
Source: data extracted from Appendix A, Table A-4

Figure 3- 5 Distribution of FDI Inflow by Country of Origin, 1985-1997



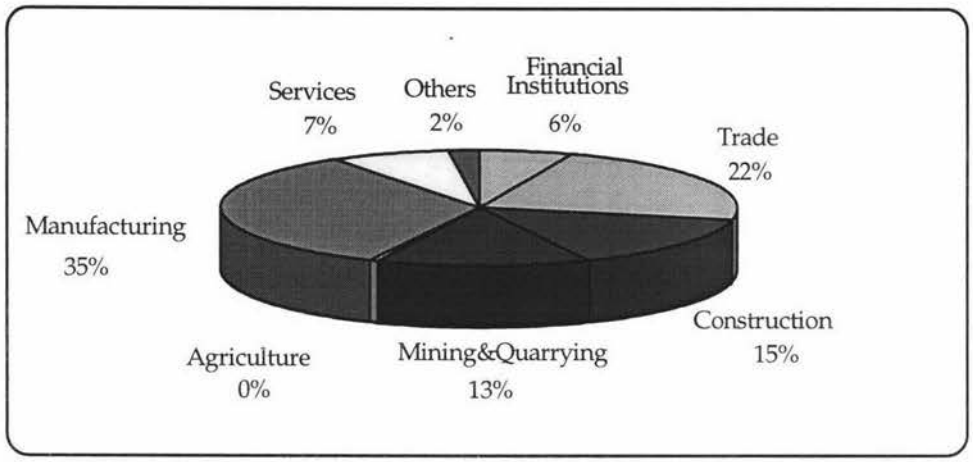
Source: data extracted from Appendix A, Table A-4

Figure 3- 6 NIEs' share of FDI inflow in Thailand, 1965-1997



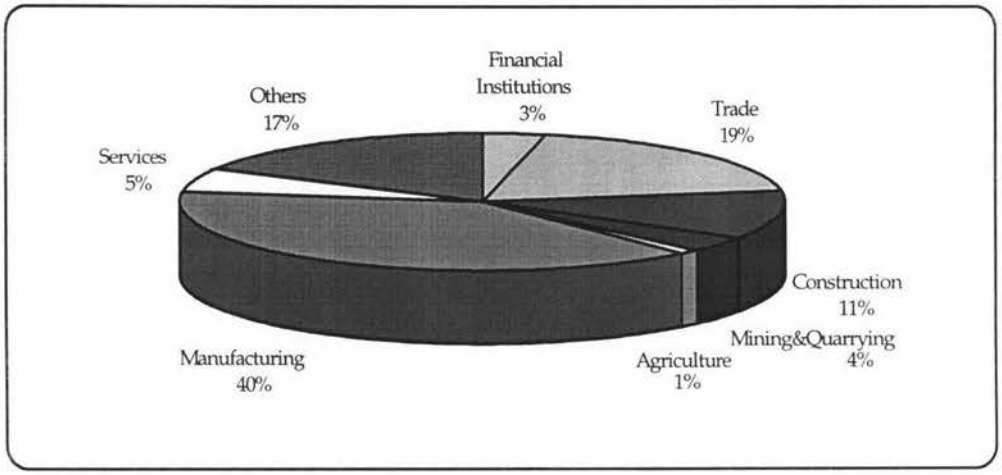
Source: data extracted from Appendix A, Table A-4

Figure 3- 7 Share of FDI by Economic Sector, 1970-1984



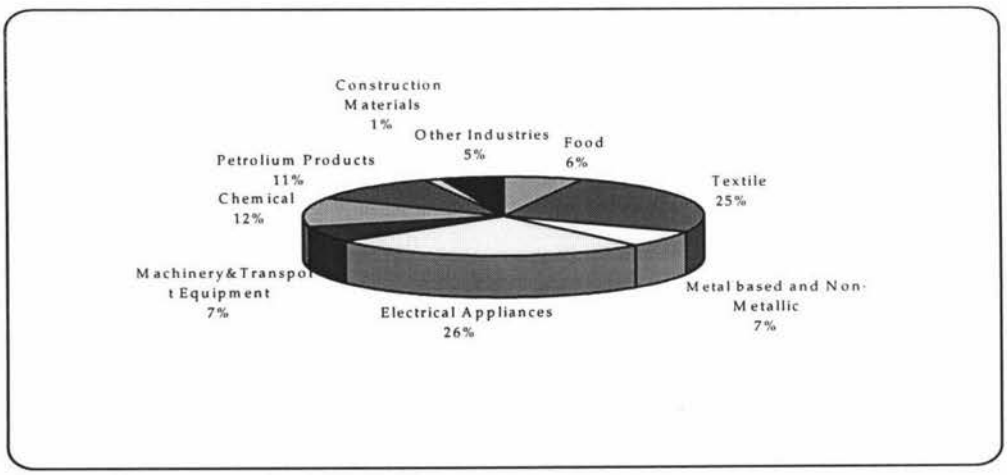
Source: data extracted from Appendix A, Table A-5

Figure 3- 8 Share of FDI by Economic Sector, 1985-1997



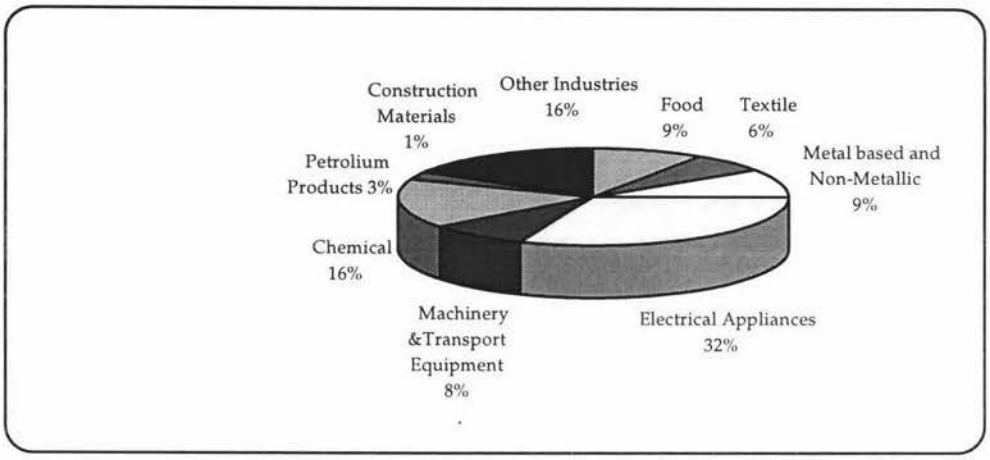
Source: data extracted from Appendix A, Table A-5

Figure 3- 9 The distribution of FDI Inflow in Manufacturing Sector, 1970-1984



Source: data extracted from Appendix A, Table A-5

Figure 3- 10 The distribution of FDI Inflow in Manufacturing Sector, 1985-1997



Source: data extracted from Appendix A, Table A-5

3.6 FDI's Contribution to Thailand Macroeconomy

In the past, a rise in FDI was followed by an upward trend in private investment, imports, exports, and GDP growth. As mentioned in Chapter 2, FDI may affect important macroeconomic variables since it makes possible access to technology, managerial expertise, marketing skills, and sourcing as well as marketing networks, which facilitate the entry into export markets and upgrade local firms. Hence, this section is devoted to discussing the relevant impacts of FDI on these macroeconomic variables.

Low wages, location advantage, and abundant natural resources primarily attracted foreign investment in Thailand. But they still relied on high technological production procedures. Hence, it may be noted that, FDI could lead to import dependence. However, the degree of import dependence is likely to depend on the nature of product manufactured (see Earmjitmetta, 1989). Apart from the fact that the machines and materials used in certain industries are not domestically available or are of low standard in terms of quality, there are other reasons to explain the heavy imports.

A number of foreign investors put more emphasis on the desire to increase the sales of their input materials, machinery, and equipment as the primary motive

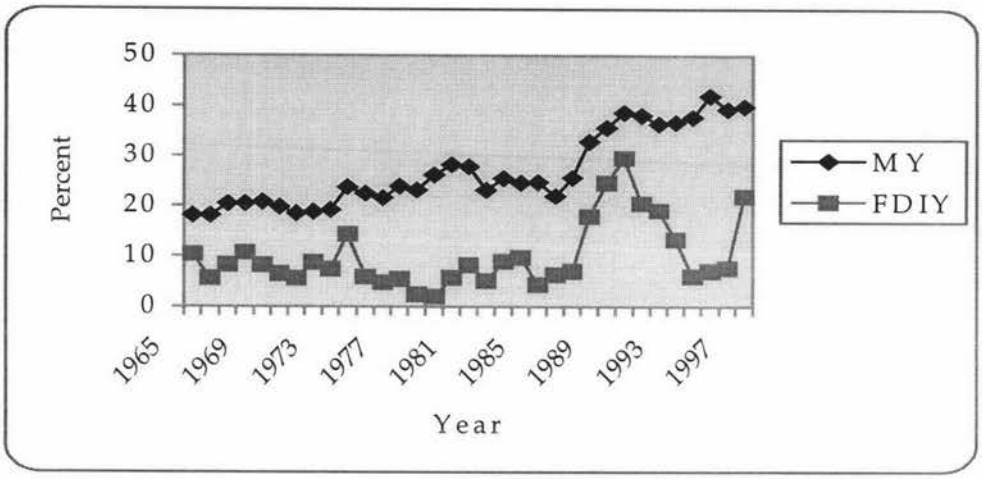
of making overseas investment. Regarding import substitution and export-oriented industrialisation policies, tax exemptions or tax reductions on imported input materials provided by the Thai government could be another factor that led to high import dependence. Therefore, to attract FDI inflow, we cannot ignore the growing imports of capital goods and necessary raw materials. Figure 3-11 shows import to GDP ratio with FDI to GDP ratio.

The figure shows that from 1972 to 1997 there is a declining trend of FDI to GDP ratio (except for 1974), but a rising trend of import to GDP ratio. According to Earmjitmetta (1989), this rising trend can be explained by the growing demand for imported materials of foreign firms in that corresponding period.

The graphs of the export-to-GDP ratio and the FDI-to-GDP ratio are presented in Figure 3-12. Although the Thai government has pursued an export promotion policy since 1972, the export ratio was quite small during the 1970s. This resulted from government intervention in export prices and the world economic recession during that period (Jarurungsipong, 1996). In addition, the export structure has been changed to a more sophisticated level with a higher export value.

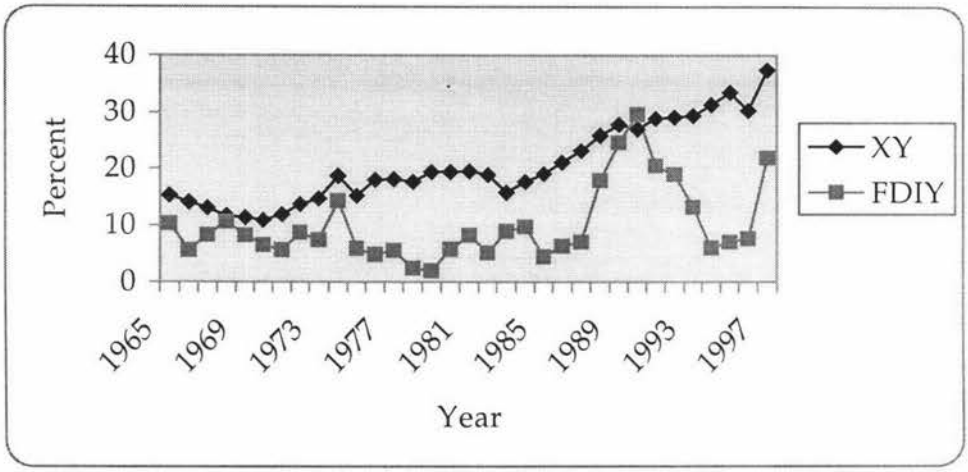
With reference to Jarurungsipong (1996), the contribution of FDI to private investment can be classified into direct and indirect contributions. The direct contribution means the increase in FDI will drive up total private investment by the same amount. The indirect contribution reflects the ability to generate forward and/or backward investments, or crowding out of domestic investment. Over the period 1965-1987, the average annual inflow of FDI accounted for 3.7 percent of annual private investment in Thailand. In 1988, the net flow was 27.9 billion baht. It reached a peak of 64.7 billion baht in 1990, which came to nearly 9 percent of total private investment (as shown in Figure 3-13). Therefore, the more FDI is, the greater the FDI in private investment contributes.

Figure 3- 11 FDI to GDP ratio (FDIY) and Imports to GDP ratio (MY)



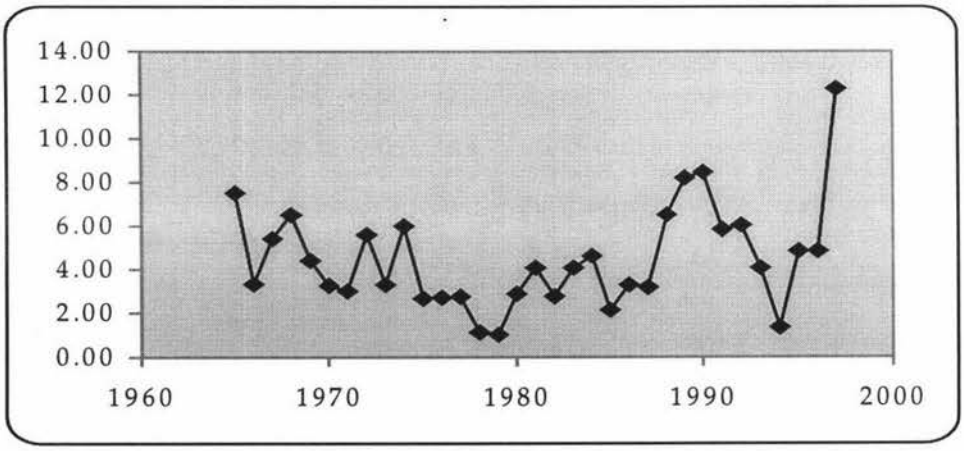
Source: data extracted from Appendix A, Table A-3

Figure 3- 12 FDI to GDP ratio (FDIY) and Exports to GDP ratio (XY)



Source: data extracted from Appendix A, Table A-3

Figure 3- 13 Net FDI inflow as percentage of Domestic Private Investment, 1965-1997



Source: data extracted from Appendix A, Table A-3

3.7 The Board of Investment and Promotional Measures for Foreign Investment

Incentives to investors were offered as early as 1954, and these became official policy with the establishment of the Board of Investment (BOI) in 1959 (BOI, 1966). Throughout the 1960s and up until the present, incentives have been offered to businessmen, Thai and foreign, under the Promotion of Investment Act. The attitude expressed by the government which held power throughout the 1960s was that foreign investment has definitely been a dynamic force in the development of Thai industries, and that if will continue to be an important force for a long time.

For simplicity's sake, the Board of Investment is commonly referred to as a single entity. In fact, however, it consists of the Board itself and the Office of the Board, the former makes policy decisions and the latter implements them.

The Board, while extremely high powered, is an intermittent organisation. It meets as often as necessary, usually once or twice a month, and during these meetings, virtually any topic, which affects the investment climate in Thailand, may be discussed. These may range, for instance, from the need to streamline awkward and cumbersome regulations and working practices to deciding, on the basis of reports submitted to it by the office, which particular types of industry should be promoted and which should have their promoted status suspended or even totally revoked. The effects of a particular action by another government ministry or organisation on investment may be discussed, and action will be decided upon which will then be implemented by the Office.

BOI is directly responsible for the administration of the Promotion of Industrial Investment Act. The investment policy was expressed through the first Investment Promotion Act of 1960, which was later revised and expanded to conform to the main policy of the First National Economic Development Plan (1961-1966), and then it became the Investment Promotion Act of 1962. This Act

was amended twice in 1965 and 1968. For a decade, while the investment climate and opportunities were excellent, everyone seemed to be tolerant of the general policy as expressed by this investment promotion Act. Under this Act, the BOI has classified industries into three groups according to the degree to which they were perceived to be vital and necessary to the economy.

Group A industries were described as the most important and most essential to the national economy. They were fully exempted from import duties and business taxes on imported raw materials. Group B industries were described as important and essential to the economy, but less than group A. They received fifty-percent reduction in duties and business taxes on imported raw materials. Other industries were classified as group C. They received one-third reduction in duties and business taxes on imported raw materials (BOI, 1966).

However, towards the end of the decade, the changing economic conditions and all kinds of difficulties, prompted the BOI to draft a new set of policies, which were incorporated into the existing Act of 1972. Under this Act, the activities eligible for promotion were listed as the following broad topics:

- Agricultural products and commodities
- Mineral, metals, and ceramics
- Chemical and chemical products
- Mechanical and electrical equipment
- Construction materials
- Textiles
- Services and miscellaneous activities
- Other products

Moreover, the promotion criteria to the investors that requested promotional privileges are divided into two categories, one for non-export activities and the other for export-oriented activities. The latter is more favoured since it will be granted promotional privileges with no special condition such as the former must have. Besides these, five special privileges are granted to prospective

investors in the 10 up-country investment promotion zones in order to develop the rural areas and to achieve the objectives of equal income distribution. However, these criteria were not successful partly due to insufficient of public facilities and the limited market in the rural areas. This Act was amended in 1977.

Although investment promotion in Thailand dates back more than three decades, the BOI was officially governed by the 1977 Investment Promotion Act, as amended by the Investment Promotion Act of 1991. The Prime Minister chairs the Board, with economic ministers, senior civil servants, representatives of major private sector organisations, and academics serving as Board Members or Advisors (BOI, 1998).

The government now places considerable emphasis on the use of BOI privileges to achieve policy targets related to export activities, to industrial deepening, and to the decentralisation of industries into the regional areas. To promote decentralisation, the BOI provides greater incentives for investment projects located in regional areas known as Zone 2 and Zone 3 (see BOI, 1998, for more details).

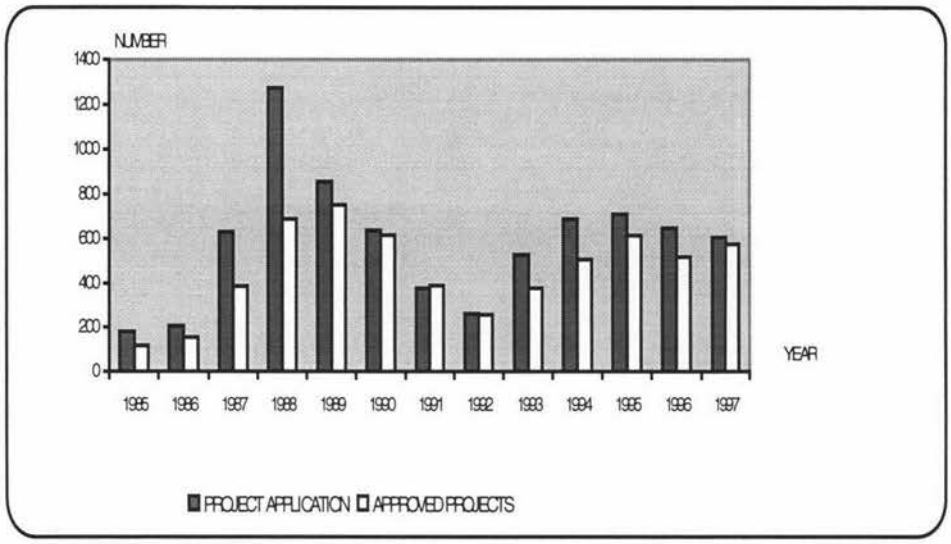
In addition, in order to categorise activities eligible for promotion according to the Thailand Standard Industrial Classification (TSIC), national economic and social development policies, and international trade and investment agreements, the Board of Investment has revised the categories and conditions for activities eligible for promotion. The eligible list is classified under the following broad headings:

- Agriculture and Agricultural Products
- Minerals, Metals, and Ceramics
- Light Industry
- Metal Products, Machinery, and Transport Equipment
- Electronics and Electrical Industry
- Chemical Industry, Paper, and Plastics

- Services and Public Utilities

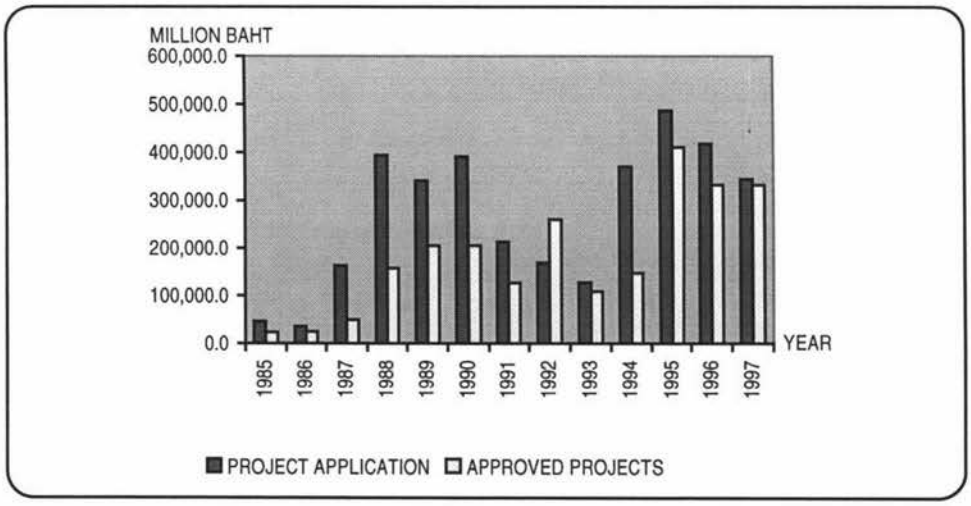
We may judge the effectiveness of these promotion investment laws from the increasing number of foreign firms. Details about these confirmations are shown in Figure 3-14 and Figure 3-15.

Figure 3- 14 The total numbers of foreign investment projects, both applied to and approved by BOI, 1985-1997



Source: data extracted from Appendix A, Table A-6

Figure 3- 15 The amount of investment by foreign projects, both applied to and approved by BOI, 1985-1997



Source: data extracted from Appendix A, Table A-6

3.8 Summary

In the past 20 years, Thailand is the envy by its such very high GDP growth rate and high volumes of trade and level of foreign investment. It was, until recently, well on its route towards joining East Asia's exclusive club of newly industrialising economies (NIEs), which at present consist of South Korea, Taiwan, Hong Kong, and Singapore.

FDI is one of the major reasons behind the industrial growth in Thailand. It first came to Thailand in the early part of the nineteenth century. As time went by, its role became stronger, especially since Thailand started the First Economic and Social Development Plan and founded the Board of Investment.

In case of Thailand, FDI not only plays a role as capital resources and foreign exchange for the investment of the economy, but also generates employment and transfers technology from its home country, which finally enhances the economic growth and transforms the industrial sector to become more dynamic and internationally competitive.

CHAPTER 4

METHODOLOGY

4.1 Introduction

In this chapter, an econometric model is formulated to capture the impact of foreign direct investment (FDI) on the important macroeconomic variables, i.e., import, export, and domestic private investment, as well as their inter-relation.

A country-specific study has been chosen in this analysis because a single country (Thailand) is of interest. Moreover, time-series information as compared to cross-sectional information is more advantageous when variables have altered a good deal over time within countries. It is for these key reasons that a country-specific, time-series framework has been favoured in this study of Thailand.

Since the analysis involves time-series data, from 1965-1997 for Thailand, particular attention is given to the possible non-stationarity of the data to avoid spurious correlations in the regression analysis. The finite autoregressive distributed lag (ARDL) method of cointegration is used in this study to estimate the stylised fact function of import, export, and domestic private investment.

The vector error correction modeling (VECM), variant of the vector autoregression (VAR) analysis, is used to investigate the inter-relation among trade, domestic investments, and FDI. Both impulse response functions and variance decomposition techniques are used to analyse such inter-relation.

This chapter is structured as follows: the second section, section 4.2, introduces three key equations, which are import, export, and domestic private investment equations. Section 4.3 looks at the estimation procedures used in this methodology. Section 4.3.1 introduces the method of autoregressive distributed

lag (ARDL), while Section 4.3.2 explains the vector autoregression (VAR) Models. Section 4.4 involves the sources of data employed in this empirical study. In the final section, section 4.5, the summary of the chapter is presented.

4.2 The Theoretical Framework

Following methodologies used by Lin (1995) and Wilamoski and Tinkler (1999), which are mentioned in Chapter 2, three single equations are developed to investigate the impact of FDI on import, export, and domestic private investment of Thailand as follows:

4.2.1 Import Function

In a small country like Thailand, the supply of all imported goods and services is assumed to be infinitely elastic. This means the import-prices are given, and the quantities of imports are determined only by import demand.

Import demand equation here is based on the traditional theory of demand, in which the quantity demanded is measured by a percentage of GDP. Since this import demand would be affected by its prices and the prices of non-tradable products, the relative price of imports to domestic products, TTM, and real effective exchange rate, REX are used in this study. Both variables are expected to have a negative relationship with the import ratio.

As income increases lead to an increasing demand for luxury goods, which are mostly produced in other countries, so, an increase in income also leads to an increase in import demand. In this study, we use the rate of economic growth, YG, as proxy for other sources of demand.

Similarly, the increase in income raises the need to invest as those investors have more money to spend. In addition, a part of each project or each investment is for importing machinery and raw materials from overseas.

Hence, the import ratio may be determined in part by the ratio of investment to GDP, (I/Y). It is expected that they would affect the import ratio positively.

In order to investigate whether FDI inflows increase import dependency, the ratio of FDI to GDP, (FDI/Y), is introduced in the model. FDI inflow could affect imports both directly and indirectly (Fry, 1993). As a direct effect, it increases the import of raw materials and capital equipment for investment that would otherwise not have taken place. As an indirect effect, FDI could also influence imports by appreciating the real exchange rate to stimulate unrelated imports, which in turn will increase the current account deficit. However, if we suppose FDI is simply a substitute for other types of capital inflows, it would have no effect either directly or indirectly on imports.

Therefore, the import demand function, M/Y, which is expressed as the ratio of imports to GDP, is

$$\frac{M}{Y} = \frac{M}{Y}\left\{REX, TTM, YG, \frac{I}{Y}, \frac{FDI}{Y}\right\} \qquad \textbf{(4. 1)}$$

4.2.2 Export Function

In the same way as applied to the import function, the export equation here is derived by using the fundamental theory of demand and supply (Nidhiprabha, 1987).

Because Thailand is a big exporter of certain kinds of goods and services and is a small exporter of others, both demand and supply then determine the volume of all exported goods and services. Theoretically, the relative prices of exports and domestic goods, (TTX), and the growth in GDP, (YG), determine the export supply. Therefore, the export supply function takes the form:

$$\frac{Xs}{Y} = \frac{Xs}{Y}\{TTX, YG\} \qquad \textbf{(4. 2)}$$

The real world income growth, YWG, as well as the real exchange rate, REX, determine the demand for exports. Thus, the export demand function takes the form:

$$\frac{Xd}{Y} = \frac{Xd}{Y}\{YWG, REX\} \qquad \textbf{(4. 3)}$$

According to the attractiveness of Export-Led Industry promoted by the BOI, FDI is an interesting factor that may accelerate exports significantly. Thereupon, FDI/Y is included to investigate the impact of FDI on exports. It is expected that exports may be positively related to the real GDP growth, the real world income growth, the FDI, the real exchange rate, and the relative price.

For simplicity, according to Jarurungsipong (1996), the export function can be a combination of equations (4.2) and (4.3), using all variables in these two equations as determinants for overall exports.

Therefore, the export function in this study takes into account both supply and demand considerations, as is:

$$\frac{X}{Y} = \frac{X}{Y}\left\{REX, TTX, YG, YWG, \frac{FDI}{Y}\right\} \qquad \textbf{(4. 4)}$$

In addition, the key variables used may affect each other in some cases; such as export may have influence on domestic private investment and/or import. In other words, it might be the intra-relationship among those variables as they are related to each other as follows.

4.2.3 Domestic Private Investment Function

The objective of profit-maximisation by a firm is an assumption in deriving the investment function in this study. That is, in a perfectly competitive market, the firm always maximises its profit;

$$Max\pi_t = p_t y_t - W_t L_t - c_t K_t \qquad \textbf{(4. 5)}$$

where y is real output and p is its price; L is the flow of labour services and w is the wage rate; K is capital stock and c is the user cost of capital; the subscript t represents each specific period. The firm maximises equation (4.5) subject to a production function, which, for simplicity, is assumed to be of the Cobb-Douglas variety,

$$y_t = AK^{\alpha}{}_t L^{\beta}{}_t \qquad (4.6)$$

Then, the Euler necessary conditions give

$$\frac{\partial y_t}{\partial L_t} = \frac{w_t}{p_t} \qquad (4.7)$$

and $$\frac{\partial y_t}{\partial K_t} = \frac{c_t}{p_t} \qquad (4.8)$$

Jorgenson derives a demand function for capital (K*) where output is exogenous (Junankar, 1972). Thus from equation (4.6),

$$\frac{\partial y_t}{\partial K_t} = \alpha A K_t^{\alpha-1} L_t^{\beta} = \frac{\alpha A K_t^{\alpha} L_t^{\beta}}{K_t} = \frac{\alpha y_t}{K_t^*} \qquad (4.9)$$

Substituting equation (4.9) into equation (4.8) yields

$$\frac{\alpha y_t}{K_t^*} = \frac{c_t}{p_t}$$

$$K_t^* = \frac{\alpha p_t y_t}{c_t} \qquad (4.10)$$

For simplicity, K_t^* can be rewritten as a proportion of output, i.e.,

$$K_t^* = v y_t \text{ where } v = \frac{\alpha p_t}{c_t} \qquad (4.11)$$

This can be expressed in terms of a desired ratio of net investment to output $(I/Y)^*$:

$$\left(\frac{I}{Y}\right)^{*} = V\psi \qquad \textbf{(4. 12)}$$

where Ψ is the rate of growth in real output (denoted YG in the regression equation) (Fry, 1988). Likewise the flexible accelerator model that capital stock is not always optimally adjusted (Junankar, 1972), the actual investment ratio ought to be adjusted partially in any one period to the difference between the desired investment ratio and the investment ratio in the previous period (λ is the coefficient of adjustment):

$$\Delta\left(\frac{I}{Y}\right) = \lambda\left[\left(\frac{I}{Y}\right)^{*} - \left(\frac{I}{Y}\right)_{t-1}\right] \qquad \textbf{(4. 13)}$$

With appropriate consideration of the structural features of the Thai economy, the speed of adjustment is determined by the ratio of FDI to GDP, (FDI/Y), credit availability as measured by change in domestic credit for private sector divided by GDP, (DC/Y), real exchange rate, REX, and the ratio of public investment to GDP, (DGI /Y).

To capture the impact of FDI on private investment rate, the ratio of FDI to GDP is included in this function. There are a number of expectations about the relationship between FDI and private investment.

By introducing relatively advanced technology, a foreign firm may impart demonstrable effects on local competitors or imitators. Furthermore, foreign firms may create forward and/or backward linkages and thereby affect upstream and/or downstream industries. On the other hand, because they possess more advanced technology and have easier access to finance, foreign firms may impede existing local competition and the entry of potential competitors. Therefore, FDI may crowd out or stimulate domestic private investment to a certain degree.

However, FDI in a protected, domestic market-oriented manufacturing sector is likely to crowd-out domestic investment, while FDI in an export-oriented primary sector or in manufacturing export-processing zone will crowd-in domestic investment (Buffie, 1993). For Thailand, whose FDI concentrates in export-oriented industry, FDI should crowd-in domestic private investment. Hence, the expected sign of FDI/Y coefficient is positive.

Credit is considered as a factor influencing the speed of adjustment of private investment because it is one of the principal constraints on investment in developing countries. Nonetheless, effective domestic costs of borrowing are difficult to measure in developing countries because of selective credit policies and disequilibrium institutional interest rates. In other words, the observable interest rates in developing countries do not reflect the scarcity of capital, either because of small capital markets or because of poorly functioning ones. Hence, the quantity rather than the price of credit are used in this study. It is expected that an increase in the domestic credit amount lead to higher private investment.

Depreciation in the real exchange rate may affect private sector profitability and dampen investment because of the higher import costs of capital goods (Chhibber and Shafik, 1992). On the contrary, it increases the profitability of investment in traded goods and may thus invite more investment. Hence, the real exchange rate has contradictory effects on private investment. Its expected sign can be either negative or positive depending on the net effect between the cost of capital goods effect and other positive effects.

Another variable that should be taken into consideration, as in other developing countries, which have been influenced by the public sector role, is the public investment rate. The relationship between private and public investment is uncertain (Blejer and Khan, 1984). This relationship may be negative and in such a case public investment crowds out that of the private

sector. On the other hand, the positive relationship appears if public sector investment is complementary to private investment.

Therefore, the adjustment coefficient (λ) is specified as:

$$\lambda = \beta_0 + \left[\frac{\beta_1\left(\frac{FDI}{Y}\right) + \beta_2\left(\frac{DC}{Y}\right) + \beta_3 REX + \beta_4\left(\frac{DGI}{Y}\right)}{\left(\frac{I}{Y}\right)^* - \left(\frac{I}{Y}\right)_{t-1}} \right] \qquad \textbf{(4. 14)}$$

Substituting equation (4.14) into equation (4.13),

$$\Delta\left(\frac{I}{Y}\right) = \beta_0\left[\left(\frac{I}{Y}\right)^* - \left(\frac{I}{Y}\right)_{t-1}\right] + \beta_1\left(\frac{FDI}{Y}\right) + \beta_2\left(\frac{DC}{Y}\right) + \beta_3 REX + \beta_4\left(\frac{DGI}{Y}\right) \qquad \textbf{(4. 15)}$$

Then, substituting equation (4.12) into equation (4.15) and rearranging, we obtain

$$\frac{I}{Y} = \beta_0 \nu\psi + \beta_1 \frac{FDI}{Y} + \beta_2 \frac{DC}{Y} + \beta_3 REX + \beta_4 \frac{DGI}{Y} + (1-\beta_0)\left(\frac{I}{Y}\right)_{t-1} \qquad \textbf{(4. 16)}$$

Therefore, the private investment function takes the form:

$$\frac{DPI}{Y} = \frac{DPI}{Y}\left\{YG, \frac{FDI}{Y}, \frac{DC}{Y}, REX, \frac{DGI}{Y}\right\} \qquad \textbf{(4. 17)}$$

4.2.4 The Inter-relation

The simple balance of payments equation as in equation (a) can lead to an analysis of macro impacts of FDI.

$$\Delta R = CA + KA \qquad \textbf{(a)}$$

ΔR in the above equation is the change in the official reserves, while CA is the current account, and KA is the capital account.

According to (a), the inflows of capital or decreases in official reserves finance the deficit in current account. As FDI is one of several capital flows, it is also one component of the balance of payments accounts. Therefore, assuming other things being equal, a rise in FDI increases capital inflows. Supposing there is no effect in the change in official reserves, a smaller current account surplus or a large current account deficit matches the increased capital inflow.

Besides, the current account itself can be defined as the difference between the national saving, S, and the domestic investment, I:

$$CA = S - I \qquad \textbf{(b)}$$

In equation (b), a straightforward link between FDI and the current account is through domestic investment. If FDI finances additional capital formation in the host country, it raises domestic investment, which in turn worsens the current account.

In addition, the current account can also be defined as the difference between exports, X, and imports, M, of goods and services plus the net factor income from abroad, NFI:

$$CA = X - M + NFI \qquad \textbf{(c)}$$

As mentioned above, FDI may worsen the current account by demanding imports of raw materials, intermediate goods or capital equipment. Instead, it may reduce exports by diverting those into the additional investment, or it may raise exports by less than it raises imports provided that it is export-oriented FDI. In any case, the current account must disintegrate in equation (c) by exactly the same amount as it does in equation (a) and (b).

Therefore, in this study, we also investigate the inter-relation among the FDI, import, export, and domestic private investment.

To summarise, the explanatory variables and independent variables used in the equations are listed as following:

Dependent Variables

DPIY : Ratio of Domestic private investment to GDP

MY : Ratio of Imports to GDP

XY : Ratio of Exports to GDP

Independent Variables

DCY : Ratio of Change in domestic credit to GDP

DGIY : Ratio of Public investment to GDP

DPIY : Ratio of Domestic private investment to GDP

FDIY : Ratio of Net inflow of FDI to GDP

IY : Ratio of Domestic investment to GDP

REX : Real Effective exchange rate

TTM : Relative prices of imports

TTX : Relative prices of exports

YG : GDP growth rate

YWG : Real world income growth rate

4.3 Estimation Procedures

This study is country-specific (Thailand) and uses thirty-three years of time series data, from 1965-1997.

The interest is in finding out how foreign direct investment (FDI) has impacted on imports, exports, and domestic private investment separately as well as how all four variables have moved together during the period of study. Regression techniques are employed. As the regression analysis of time-series data can be done by two approaches, i.e., by the econometric models and by the time-series models, the study will use both approaches in order to benefit from the insights that these two approaches offer.

An 'econometric' approach is taken to construct individual equations for imports, exports, and domestic private investment, as this approach has an advantage in modeling long term effects. The specific model used is the autoregressive distributed lag (ARDL) which allows the estimation of long run and short run variants of the individual equations and also minimises the possibility of estimating spurious relations.

The hypotheses, which are investigated with the above methods, are

i) FDI has not exerted significant impact on imports

ii) FDI has not exerted significant impact on exports

iii) FDI has not exerted significant impact on domestic private investment

Furthermore, to characterise the co-movements among the four variables simultaneously, a 'time-series' approach is taken. The specific model employed is the vector autoregression model (VAR). A variant of VAR, the VECM or the vector error correction model, is employed since it is preferable to unrestricted VAR when variables in the VAR are cointegrated.

The two questions to be investigated with the VECM are:

i) How do imports, exports, domestic private investment, and foreign direct investment respond over time to shocks, in each of them?

ii) Which shocks are the primary sources of fluctuations in the variables?

The following are the details about the two analytical methods used in the study.

4.3.1 Autoregressive Distrib uted Lag (ARDL)

In the estimation that follows, attention is given to the dynamic interactions among the variables under investigation, and hence, the need to capture the long run relationship of those variables. Attention is also given to the possible non-stationarity of the data in order to avoid the spurious results in the

regression analysis which arise when the regression variables suffer non-stationarity or have a different integrated order, which is common in the time series and cross-country data (Gujarati, 1995). By taking these issues into account, the estimation of equations (4.1), (4.4), and (4.17) are conducted using the finite Autoregressive Distributed Lag (ARDL) method of cointegration, recently developed by Pesaran and Shin (1995).

The ARDL method of cointegration minimises the possibility of estimating spurious relations while retaining long run relationship information (Hendry, 1995). There are several advantages of using the ARDL method, however. The main advantage of the ARDL procedure over other cointegration methodologies as stated by Pesaran is that it avoids the requirements of pre-testing the order of integration. In other words, the ARDL approach to cointegration does not require the knowledge of whether the variables under consideration are I(1) or I(0) (Pesaran and Pesaran, 1997). Also, this method avoids the problem of serial correlation that arises in the residual-based cointegration methods by an appropriate augmentation (Pesaran et.al, 1996).

The ARDL model takes the following form:

$$Y_t = \alpha + \sum_{i=1}^{m} A_i Y_{t-i} + \sum_{i=1}^{m} B_i X_{t-i} + \mu_t \qquad \textbf{(4.3.1. 1)}$$

where Y_t is a (n x 1) vector of endogenous variables, α is a vector of constants, X_t is a (k x 1) vector of explanatory variable of equation (4.1), (4.4), and (4.17), A_i and B_i are (n x n) and (n x k) matrices of parameters that can be chosen according to the various criteria such as Schwarz Bayesian Criterion, R-Bar Squared Criterion, Akaike Information Criterion, or Hannan-Quinn Criterion.

The two-step procedure is used in estimation. Firstly, the long run relationship between variables under investigation is tested by computing F-statistics, which the statistic of the joint test of the null hypothesis that the coefficient C_0 and C_1, in the following equation, equal zero (i.e. there is no long run relationship between them).

$$\Delta Y_t = \alpha + \sum_{i=1}^{m-1} A_i \Delta Y_{t-i} + \sum_{i=1}^{m-1} B_i \Delta X_{t-i} + C_0 Y_{t-1} + C_1 X_{t-1} + \mu_t \qquad \textbf{(4.3.1. 2)}$$

F-statistic is used to compare with the critical value table that Pesaran and Pesaran (1997) have tabulated. There are two sets of these critical values, one set assuming that all the variables in the ARDL model are of I(1), and the other computed assuming all the variables are I(0). This table provides the critical values for each application, the band covered all the possible classifications of the variables into I(1) and I(0), or even fractionally integrated ones. If the computed F-statistic falls outside this band, a conclusive decision can be made without needing to know whether the underlying variables are I(1) and I(0). If the computed F-statistic is higher (lower) than the upper (lower) bound of the critical value, the null hypothesis would be rejected (accepted). On the other hand, if the computed statistic falls within the critical value band, information on the order of integration is necessary before making decisions regarding the long run relationship.

The second stage of the ARDL procedure is to estimate the coefficients for the short run and long run relationship. The long run coefficients of the equation can be obtained by estimating equation (4.3.1.1), where $C_0^{-1}C_1$ is a formula of the long run coefficient, in which $C_0 = -\left(1 - \sum_{i=1}^{m} A_i\right)$, and $C_1 = \left(\sum_{i=1}^{m} B_i\right)$. While the short run coefficients of the equations can be obtained by estimating the error correction model as follows:

$$\Delta Y_t = \alpha_0 + \sum_{i=1}^{m-1} B_i \Delta X_{t-i} + \alpha_1 \mu_{t-1} + \vartheta_t \qquad \textbf{(4.3.1. 3)}$$

where α_0 is constant, B_i is the short run coefficient of the equation, and $\alpha_1$is coefficient that captures the adjustment toward the long run equilibrium.

The ARDL estimates of the coefficient are selected based on R-Bar Squared Criterion. Additionally, the goodness of fit criteria and properties of the model are given in the diagnostic tests, which consist of the Lagrange multiplier test of

residual serial correlation, Ramsey's RESET test for functional form, normality of the residuals based on test of skewness and kurtosis, structural stability and heteroskedasticity.

4.3.2 The Vector Autoregression (VAR) Model

A preceding section discussed factors determining M, X, and DPI. However, it is possible that the explanatory variables, i.e., import, export, domestic private investment, and FDI, may have inter-relations among each other as indicated in the accounting identity section 4.2.4. For example, exports may cause FDI, as well as FDI causing exports.

The vector autoregressions (VAR) modeling offers an attractive frame of reference to judge the quantitative significance of interactions among the key macro-variables. The VAR methodology initially put forward by Sims (1980) has been developed by some economists such as Bernanke (1986) and Rodrigues (1990).

VAR analysis is useful since it treats all variables symmetrically (Wilamoski and Tinkler, 1999). In addition, researchers interested in gaining a greater understanding of relationships between group economic variables have primarily used VARs. Impulse response functions and forecast error variance decompositions are the two major by-products of the VAR methodology, which provide interpretable information with regards to the various relationships encompassed within the VAR.

The theory underlying the VAR is somewhat complex. Pesaran and Pesaran (1997) provide a detailed explanation of the VAR methodology as follows.

Equation (4.3.2.1) is a representation of the VAR model.

$$Z_t = a_0 + \sum_{i=1}^{n} \phi_i Z_{t-i} + \Psi w_t + u_t \text{ ,t = 1, 2,..., n} \qquad \textbf{(4.3.2. 1)}$$

where Z_t is a mx1 vector of jointly determined dependent variables,

a_0 is a m x 1 row vector,

ϕ_i is mxm matrices of coefficients to be estimated, and

w_t is a qx1 vector of deterministic or exogenous variables, and

u_t is a m x 1 vector of unobserved disturbances assumed to satisfy the following assumptions:

1. Zero mean assumption. The m x 1 vector of disturbances, u_t, has zero mean: $E(u_t)=0$ for $t=1,2,...,n$
2. Homoskedasticity assumption. The m x 1 vector of disturbances, u_t, has a time-invariant conditional variance matrix.
   $E(u_t u_t' \mid z_{t-1}, z_{t-2})=\sum$, where $\sum = (\sigma_{ij})$ is an mxm symmetric positive definite matrix.
3. Non-autocorrelated Error assumption. The m x 1 vector of disturbances, u_t, is serially uncorrelated: $E(u_t u_s')=0$ for all $t \neq s$.
4. Orthogonality assumption. The m x 1 vector of disturbances, u_t, and the regressors, w_t, are uncorrelated; $E(u_t \mid w_t)=0$ for all t.
5. Stability assumption. The augmented VAR(p) is stable. That is, all the roots of the following determinantal equation fall outside the unit circle.
6. Normality assumption. The m x 1 vector of disturbances, u_t, has a multivariate normal distribution. This assumption is required for the use of a maximum likelihood function.

4.3.2.1 Impulse Response Function and Variance Decompositions

VAR results can be interpreted in several ways. The anticipated policy analysis is conducted using joint F-test on the estimated coefficients. The significance of the F-tests, based on the hypothesis that all lags of a given variable for a particular equation are zero, helps establish causation. Both Impulse Response Functions (IRFs) and Forecast Error Variance Decompositions (FEVs), (together called *innovation accounting*) are used to analyse the impact of unanticipated shocks.

Nevertheless, IRFs and FEVs can be useful tools to examine the relationships among economic variables. If the correlations among the various innovations are small, the identification problem is not likely to be especially important. The alternative orderings should yield similar impulse responses and variance decompositions. Of course, the contemporaneous movements of many economic variables are highly correlated.

In the rest of this section, more details about Impulse Response Analysis and Forecast Error Variance Decomposition are provided.

Impulse Response Analysis (IRF)

Pesaran and Pesaran (1997) describe the impulse response function as a function that "measures the time profile of the effect of shocks on the future states of a dynamical system". That is, we are able to determine the reaction of the variables in the VAR for a one standard deviation shock to a given variable. There are two types of impulse response function, which are the orthogonalised IRF, advocated by Sims (1980), and generalised IRF more recently proposed by Koop, Pesaran, and Potter (1996), and Pesaran and Shin (1997).

The differences between the two lie with the relative importance they place on the ordering of the variables in the VAR. They are therefore normally analysed in the context of different VAR orderings. However, this approach is not practical when dealing with a large number of variables. The orthogonalised approach is also problematic when the researcher has little knowledge of the correct order of the variables. Responding to the limitations of the orthogonalised approach, Koop et. al., (1996) and Pesaran and Shin (1997) developed the generalised IRF. Generalised IRFs provide results that are independent of the ordering of the variables in the VAR.

Unlike the orthogonalised impulse responses, the generalised impulse responses are invariant to the ordering of variables in the VAR. However, the

two impulse responses will be the same for the first variable in the VAR or in situations where the system covariance matrix of errors is diagonal matrix. It is interesting to note that the ordering of the variables in the VAR is only important when the error terms of the various regression equations in the VAR system are correlated. When they are not, the orthogonalised and generalised methods will give similar results [for details, see Pesaran and Shin (1997)].

Forecast Error Variance Decompositions

The second major analytical tool provided by VAR modeling is the forecast error variance (FEV) decompositions. The FEV decomposition is used to give an indication of the 'proportion of the movements in a sequence due to its own shocks versus shocks to another variable' (Enders, 1995). In other words, they show the proportion of FEV for each variable due to innovations in other variables within the system. If a shock to one variable, x, explains none of the FEV of variable, y, the series is said to be exogenous. If, at the other extreme, shocks to the x series explain all of the FEV of series y, series y is said to be endogenous. In addition, as in the IRFs, there are orthogonalised and generalised versions of the FEV decompositions.

4.3.2.2 Vector Error Correction Model (VECM)

Sims (1980) VAR provided researchers with an innovative method of determining the relationship between a number of jointly endogenous variables. Sims' contribution marked a significant turning point in multivariate modeling by providing a method "largely but free of the spurious specification assumptions and consequent specification errors necessitated by traditional macroeconometric procedures" (Spencer, 1989, p.442). However, from their inception, VAR methodology has received considerable criticism directly relating to their non-restrictive nature. The major criticism of the VAR relates to its interpretation. It is argued that the mechanical nature of VAR modeling,

combined with the lack of economic theory required in formulating the VAR, allows for little economic interpretation from the VAR result.

A recent innovation in VAR modeling is that of the cointegrating VAR. Park and Phillips (1988) and Sims, Stock, and Watson (1990) have shown that traditional VAR modeling is inappropriate when modeling variables that are cointegrated. That is, conventional asymptotic theory, on which VAR modeling is based, is not applicable for a system of cointegrated variables. The cointegrating of VAR is essentially a restricted version of the traditional VAR approach, and as with bivariate cointegration, an error correction component is required in a VAR containing cointegrated variables. Engle and Granger (1987) provided the theoretical justification of this by showing that a VAR cointegrated variables can be written as a vector error correction model. Essentially, a "vector autoregression can be interpreted as a vector error correction in which there are no cross equation constraints" (Naka and Tufte, 1997, p.1594)

In this study, we use vector error correction modeling (VECM) to examine the interactions between key variable, i.e., imports, exports, domestic private investment, and foreign direct investment. A VECM is, in essence, a VAR model that incorporates an error-correction term. The inclusion of an error-correction term in VAR model allows the estimated model to reflect long run equilibrium constraints, while, at the same time, permitting flexibility in the short run dynamics captured by the VAR (Wilamoski and Tinkler, 1999).

Cointegrated VAR and Impulse Response Analysis

The theory behind impulse response analysis of the cointegrated VAR system is developed by Lutkepohl and Reimers (1992), who draw upon the full-information maximum likelihood based procedure developed by Johansen and Juselius (1990). Their VAR modeling is very powerful and flexible since it can

accommodate a stationary VAR, differenced VAR, and a cointegrated VAR system (Moon and Jain, 1995).

Lutkepohl and Reimers demonstrated that it might be misleading to interpret the coefficients from the cointegrating relationships as the long run elasticities or semi-elasticities of the corresponding variables. They suggest that impulse response analysis of the cointegrated system with multiple cointegrating roots may be more appropriate.

Furthermore, as stated above, before using the VAR analysis, it is necessary for all variables to be stationary. To test for stationarity and the order of integration of the relevant time series, augmented Dickey-Fuller tests (ADF) are applied, as some economists claim that it is the most useful test in the empirical works. If a group of variables is integrated of order one, I(1), that is they are stationary only in first differences, then it is necessary to test whether the group is cointegrated before estimating a VAR in first differences. A model estimated in first differences removes common influences but also information about long run relationships among the variables. A group of nonstationary variables will be cointegrated if some linear combination of them is stationary.

The long run cointegration relationships can be estimated and used as cross-equation restraints in VAR models. To test for cointegration, the ADF is applied to the residual series obtained from estimating the long run relationship in levels.

Steps in the Estimation Procedure

The estimation procedure of a vector autoregressive model of order p or VAR(p) can be summarised in four simple steps:

Step 1: Testing for Unit Roots

The first step in VAR modeling is to test for the order of integration of the variables in the VAR. The knowledge of the order of integration of the

variables in a regression is important for optimal inference (Phillips and Perron, 1988). We use the augment Dickey-Fuller (ADF) test to determine the order of integration of the imports, exports, domestic private investment, and FDI variables.

Step 2: Determining the Order of the VAR

The order of augmented VAR model, p, can be selected either with the help of model selection criteria, such as the Akaike Information Criterion (AIC) and the Schwartz Bayesian Criterion, or by means of a sequence of log-likelihood ratio tests. In our study, we determine the order (the optimal lag length) of the VAR model by the AIC and the SBC.

Step 3: Testing for Cointegration

The Johansen (1988) and the Johansen and Juselius (1990) cointegration techniques allow us to estimate the long run relationships between the non-stationary variables using a maximum likelihood procedure which tests for cointegrating rank r and estimates the parameter of these cointegrating relationships.

Step 4: Estimating Impulse Responses and Variance Decompositions

Impulse response functions measure the time-profile of the effect of shocks on the future states of the dynamical system represented by the VAR, while forecast error variance decompositions provide a decomposition of the variance of the forecast errors of the variables in the VAR at different horizons.

4.4 Sources of Data

The study employs thirty-three observations of annual time series data for Thailand covering the period of 1965-1997. Most of the data were obtained from the Department of Economic Research and the Monthly Bulletin of the Bank of Thailand, and the International Financial Statistics Yearbook of the International Monetary Fund.

Some data were transformed to meet the need of current research.[2] The domestic price index (P) is defined as GDP deflator and normalised to unity for the year 1980. In addition, all data are expressed in real terms at 1980 prices.

4.5 Summary and Conclusion

This chapter detailed the modeling framework, estimation procedures, and data employed to investigate the impact of foreign direct investment (FDI) on Thailand's important macroeconomic variable, i.e., import, export, and domestic private investment.

Since the analysis involves annual time-series data, during the period of 1965 to 1997, it is important to employ an appropriate estimation procedure so as to overcome the problems of spurious regression common in time series data. The study will utilise the finite ARDL estimation to examine empirically for the short-term and long-term relationships, in other words, to find the answer to our hypotheses.

In addition, the vector error-correlation model (VECM) or cointegrating vector autoregressions (VAR), which is one of the VAR analysis, is applied to investigate the inter-relation among the explanatory variables. The two important techniques of the VAR used in the study are impulse response functions and variance decomposition techniques.

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[2] During the past three decades, most trade transactions of the Thai economy dealt with the US, Japan, Germany, and the UK. Therefore, the nominal effective exchange rate is calculated from US dollar, Japanese yen, Deutsche mark, and Pound sterling. The following steps can explain the computation. Firstly, the selected exchange rates (in terms of baht per foreign currencies) are transformed to index terms at 1980 as the base period. Secondly, the weighted average of the exchange rate indices is performed. The weights are calculated from the average proportions of trade with important trade partners of Thailand between 1965 and 1997.

Some other methodologies such as the F-statistic test, and the augmented Dickey-Fuller tests (ADF) are applied to support the estimations.

Empirical results for each of the regression equations discussed here, together with their implications, will be reported in the following chapter.

CHAPTER 5

EMPIRICAL RESULTS

5.1 Introduction

This chapter presents the empirical results of the impact of foreign direct investment (FDI) on Thailand's trade and domestic private investment for the period of 1965 to 1997.

The estimation method of finite auto regressive distributed lag (ARDL) has been employed to examine the short-term and long-term relationships between dependent and explanatory variables. The econometric package employed in this study is Microfit Version 4.0 (Pesaran and Pesaran, 1997).

Since the ARDL method avoids the pre-testing requirement for the stationary properties of the data, the F-test is applied to test for the existence of a long-run relationship between the dependent and explanatory variables. Based on this methodology, the results reported in this chapter are not spurious and the model diagnostics are not subject to any problems of serial correlation, functional form, normality of the residual, structural instability, and heteroskedasticity, that are typically encountered in time series analysis.

Furthermore, vector error correction models (VECM) or the co-integrated VAR is applied to investigate the inter-relation among trade, domestic private investment (DPI), and foreign direct investment (FDI). Impulse response functions and variance decomposition techniques are used to analyse such inter-relation. Also, to test for stationarity and the order of integration of the relevant time series, augmented Dickey-Fuller tests (ADF) are applied.

The structure of this chapter is as follows: section 5.2 presents the empirical results of the ARDL procedure to test for dynamic interaction, short run, and

long-run relationships in the equations estimated. The F-test in turn is reported for each variable. The results of the VAR analysis are discussed in section 5.3. Finally, a conclusion completes this chapter in section 5.4.

5.2 Empirical Results from the ARDL analysis

As stated above, the study employs an econometric package named Microfit Version 4.0 advanced by Pesaran and Pesaran (1997) to investigate the impact of foreign direct investment (FDI) on Thailand's trade and domestic private investment for the period of 1965 to 1997.

Having computed F-statistics for testing the significance of the lagged levels of the variables, it is essential to determine the critical values as the first step of this analysis. Pesaran and Pesaran (1997) have tabulated the appropriate critical values for different numbers of regressors and whether the ARDL model contains an intercept and/or trend. There are two sets of these critical values. One set assumes that all the variables in the ARDL model are integrated of order one, I(1), and the other assumes all the variables are integrated of order zero, I(0).

For each application, this provides a band covering all the possible classifications of the variables into I(1) and I(0), or even fractionally integrated ones. If the computed F-statistic falls outside this band, a conclusive decision can be made without needing to know whether the underlying variables are I(1) or I(0). If the computed F-statistic is higher (lower) than the upper (lower) bound of the critical value, the null hypothesis would be rejected (accepted). In contrast, if the computed F-statistic falls within the band, information on the order of integration is necessary before making decisions regarding the long-run relationship. The results of the F-statistic tests on this analysis are shown in Table 5-1.

Table 5- 1 F-statistic test from the ARDL procedure

Equation	k	Critical Value Band at 99% level Intercept and No trend		F-statistic	Pass/Fail test
		I(0)	I(1)		
M	6	3.267	4.540	3.204	Pass
X	6	3.267	4.540	0.423	Pass
DPI	6	3.267	4.540	0.834	Pass

Legend: **DPI**: domestic private investment, **M**: imports, **X**: exports, **k**: the leg length used in ADF regressions to induce white noise residuals

From the results reported in Table 5-1, all the equations estimated fall outside the critical value band at 99 percent level of significance, which means all the equations passed the F-statistic test. In other words, this means the null hypothesis of no long-run relationship between dependent and explanatory variables can be rejected, irrespective of the order of their integration for each equation tested in this study.

The second step of the analysis is to estimate the coefficients of the short-run and long-run relationships and provide explanations about their values using the ARDL co-integration techniques by the R-Bar Squared Criterion. A complete description of the variables employed in the study is presented in Appendix B. In this analysis, all the models perform satisfactorily in terms of the conventional tests, i.e., adjusted R^2 and F-test.

Generally, most variables in the estimated models took their expected signs. The following section reports the results for three equations, i.e., import, export, and domestic private investment.

All equations have a relatively high explanatory power in terms of adjusted R^2 values between 93 to 98 percent, and the specifications F-statistics are statistically significant at the one percent level for all three equations.

In addition, the model diagnostics are not subject to the econometric pathologies, i.e., serial correlation (SC), functional form (FF), normality of the residuals (Norm), and heteroskedasticity (H). Comments on each of the estimated equations and the statistical significance, or lack of, for each variable are explained below. Moreover, the results of F-test as reported in Table 5-1, indicate that each equation has a long-run relationship at one- percent critical level. Therefore, the interpretation of each equation will include a discussion of the long-run effect as estimated for all equations.

5.2.1 Import Function

For the Import function, the goodness of fit test as indicated by the estimated value of adjusted R^2, shows that the regressors explain about 96 percent of the variation in the dependent variable, and the F-statistic is statistically significant at the 1 percent critical level.

The Estimated ARDL Model for Imports

MY = -17.38 + 0.05REX + 0.07TTM + 0.07YG + 1.15IY + 2.63FDIY -3.03FDIY(-1)
(-3.51)* (1.18) (1.56) (0.57) (18.45)* (3.42)* (4.00)*

Adjusted R^2 = 0.96, S.E. = 1.49, F-statistic = 112.36*, Sample Range: 1966-1997.
Diagnostic Tests: SC$\chi^2(1)$ = 0.20, FF$\chi^2(1)$ = 0.14, Norm$\chi^2(2)$ = 0.41, H$\chi^2(1)$ = 0.08

Notes: Figures in parentheses below the coefficients are t-ratios.
*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

From the estimated equation, three out of seven explanatory variables are significant at the 1 percent level. IY and FDIY obtain coefficients of 1.15 and 2.63, respectively, which mean a 1 unit increase in domestic investment leads to a 1.15 point increase in import, while a unit increase in FDI induces 2.63 point increase in import. In addition, the lag value of FDIY, FDIY(-1), has a negative impact on imports. The other explanatory variables, i.e., REX, TTM, and YG all have positive coefficients, but they are not significant. This implies that the

increase in real effective exchange rate, relative price of import and economic growth are unlikely to have a direct effect on the imports of Thailand.

The Short-run Model for Imports

$$\Delta MY = -17.38 + 0.05\Delta REX + 0.07\Delta TTM + 0.07\Delta YG + 1.15\Delta IY + 2.63\Delta FDIY$$
$$(3.51)^* \quad (1.18) \quad (1.56) \quad (0.57) \quad (18.45)^* \quad (3.42)^*$$

Adjusted $R^2 = 0.63$, DW = 1.78, S.E. = 1.49, F-statistic = 8.58*, Sample Range: 1966-1997.

Notes: Figures in parentheses below the coefficients are t-ratios.

*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

In terms of the short-run relationship, only the coefficients of net FDI inflow ratio, FDIY, and domestic investment ratio, IY, are positive and significantly different from zero at the 1 percent level. The net FDI inflow obtains a coefficient of 2.63, which implies a 2.63 point increase in import due to an unit increase in FDI. The remaining variables have both positive and negative coefficients, but they do not appear to be exerting any significant influence on Thailand's importation, over the observed period.

The Long-run Model for Imports

$$MY = -21.47 + 0.07REX + 0.08TTM - 0.01YG + 1.13IY + 1.80FDIY$$
$$(3.14)^* \quad (1.34) \quad (1.45) \quad (-0.04) \quad (14.23)^* \quad (1.93)^{***}$$

Notes: Figures in parentheses below the coefficients are t-ratios.

*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

The long-run relationship indicates the same impact on imports as the short-run result, except for the economic growth. Increase in the domestic investment ratio, IY, and net FDI inflow ratio, FDIY, have contributed in raising imports. IY is significant at the 1 percent level with a coefficient of 1.13, such that, each 1 point increase in IY leads to a 1.13 point increase in the import ratio.

Similarly, FDIY is significantly different from zero at the 10 percent level. Every 1 point increase in FDIY ratio induces 1.80 point in import ratio. This finding confirms earlier studies, (e.g. Earmjitmetta (1989) and Jarurungsipong (1995), that FDI causes import dependency in Thailand to a certain degree. The real effective exchange rate, REX, coefficient has an expected (positive) sign. This finding confirms the study of Jarurungsipong (1995).

5.2.2 Export Function

The Estimated ARDL Model for X

$$XY = \underset{(2.01)^{***}}{10.41} + \underset{(11.52)^{*}}{0.62}XY(-1) - \underset{(-1.84)^{***}}{0.10}REX + \underset{(2.37)^{**}}{0.07}TTX - \underset{(-1.73)^{***}}{0.05}TTX(-1) - \underset{(-0.41)}{0.06}YG - \underset{(-0.99)}{0.24}YWG + \underset{(0.98)}{0.08}FDIY - \underset{(-1.37)}{0.11}FDIY(-1)$$

Adjusted R^2 = 0.93, Durbin-h statistic = -1.16, S.E. = 1.83, F-statistic = 57.53*, Sample Range: 1966-1997.

Diagnostic Tests: $SC\chi^2(1) = 1.86$, $FF\chi^2(1) = 0.14$, $Norm\chi^2(2) = 3.18$, $H\chi^2(1) = 2.97$

Notes: Figures in parentheses below the coefficients are t-ratios.

*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

The first five coefficients in export equation are significant. FDI variable obtains the expected positive sign, which suggest that the increase in FDI leads to an increase in the exports. To analyse the dynamic adjustment, its coefficient can be calculated as one minus the coefficient of the lagged dependent variables[3]. This indicates that about 38 percent of the adjustment to a change in the explanatory variables of the exports takes place in the current period. In other words, the effect of change in the explanatory variables on the export is about 2.6 times greater in the short-run than it does in the long run[4].

---

[3] That is 1-0.62 = 0.38 or about 38 percent

[4] That is 1/0.38= 2.6315 or 2.6 times

The Short-run Model for X

$\Delta X = 10.41 - 0.10\Delta REX + 0.07\Delta TTX - 0.06\Delta YG - 0.24\Delta YWG + 0.08\Delta FDIY$

(2.01)*** (1.84)*** (2.37)** (-0.41) (-0.99) (0.98)

Adjusted $R^2 = 0.27$, DW = 2.35, S.E. = 1.83, F-statistic = 13.27**, Sample Range: 1966-1997.

Notes: Figures in parentheses below the coefficients are t-ratios.

*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

The short-run relationship claims that the relative price of exports, TTX, has the correct positive sign with statistically significant at the 1 percent level. REX obtains a negative coefficient and significant at 10 percent level. On the other hand, FDI is positive with a coefficient of 0.08 but it is not significant.

The Long-run Model for X

XY= -50.39 + 5.03REX – 0.99TTX + 2.80YG +11.46YWG + 1.73FDIY

(-0.22) (0.24) (-0.29) (0.20) (0.22) (0.27)

Notes: Figures in parentheses below the coefficients are t-ratios.

*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

In the long-run specification, all of the coefficients in export equation earn the expected signs. However, they do not appear to exert a significant effect on exports in this specification.

5.2.3 Domestic Private Investment Equation

The Estimated ARDL Model for DPI

DPIY= - 3.04 + 0.51DPIY(-1) + 0.23YG + 0.25YG(-1) + 0.58FDIY + 1.64FDIY(-1) -0.02DCY

(-0.72) (3.52)* (2.31)** (2.34)** (0.98) (1.70) (-0.33)

+ 0.12DCY(-1) + 0.16REX – 0.12REX(-1) – 0.08DGIY

(1.66) (2.54)** (-1.82)*** (-0.32)

Adjusted R^2 = 0.96, Durbin-h statistic = 1.49, S.E. = 1.23, F-statistic = 82.98*, Sample Range: 1966-1997.

Diagnostic Tests: $SC\chi^2(1)$ = 0.34, $FF\chi^2(1)$ = 0.72, $Norm\chi^2(2)$ = 1.83, $H\chi^2(1)$ = 0.70

Notes: Figures in parentheses below the coefficients are t-ratios.

*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

All of the coefficients in the above equation took the expected signs, except DCY. The dynamic adjustment for the domestic private investment equals 0.49[5], implying that almost 50 percent of the adjustment to a change in the explanatory variables of domestic private investment occurred in the current period.

Besides, in this equation, the causal relationship between DPIY and YG could go in the other way round, i.e., DPIY might affect YG. That would create the exogeneity problem, which could result in inefficient estimates of the coefficients in the equation. The *Granger-causality* test was performed to circumvent this problem.

Granger (1969) introduced a concept of causality in which, broadly speaking, a variable y is said to be "Granger-caused" by another variable x if current values of y can be predicted with better accuracy by using past values of x. Testing for Granger causality essentially involves setting up a vector autoregression, in which all the variables of the system are expressed as linear functions of their own and each other's lagged values (IMF, 1996). *F-tests* are then computed to test whether lagged values of any of the other variables enter a given equation significantly.

[5] That is 1-0.51 = 0.49 or about 49 percent

Such tests reveal that, in the case of Thailand's DPIY and YG, the direction of causality seems to be from the growth of GDP to domestic private investment rather than the other way around, as shown in the following results:

LR Test of Block Granger Non-Causality in the VAR

****

Based on 31 observations from 1967 to 1997. Order of VAR = 2

List of variables included in the unrestricted VAR: DPIY YG

List of deterministic and/or exogenous variables: INPT TREND

Maximized value of log-likelihood = -123.6805

****

List of variable(s) assumed to be "non-causal" under the null hypothesis: DPIY

Maximized value of log-likelihood = -124.7187

****

LR test of block non-causality, CHSQ(2)= 2.0763[.354]

****

The above statistic is for testing the null hypothesis that the coefficients of the lagged values of: DPIY in the block of equations explaining the variable(s):

YG are zero. The maximum order of the lag(s) is 2.

****

The Short-run Model for DPI

$$\Delta DPIY = -3.04 + 0.23\Delta YG + 0.58\Delta FDIY - 0.02\Delta DCY + 0.16\Delta REX - 0.08\Delta DGIY$$

(-0.72) (2.31)** (0.98) (-0.33) (2.54)** (-0.32)

Adjusted R^2 = 0.69, DW = 1.7, S.E. = 1.23, F-statistic = 13.07*, Sample Range: 1966-1997.

Notes: Figures in parentheses below the coefficients are t-ratios.

*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

In terms of the short-run relationship, the coefficients of economic growth, YG, and the real effective exchange rate, REX, are the only two variables that are both positive and significantly different from zero at 5 percent level. Foreign Direct Investment, FDIY, has the correct (positive) sign; however, it is not statistically significant. The domestic credit ratio, DCY, and public investment, DGIY, do not appear to exert a significant effect on the growth of output in this specification.

The Long-run Model for DPI

DPIY= - 6.18 + 0.98YG + 4.51FDIY + 0.19DCY + 0.08REX – 0.16DGIY

(-0.74) (2.77)** (4.04)* (6.16)* (1.15) (-0.32)

Notes: Figures in parentheses below the coefficients are t-ratios.

*, **, *** represent the significance level different from zero at 1, 5, and 10 percent level, respectively.

In the long run, the ratio of net FDI inflow to GDP, FDIY, and economic growth, YG, are found to have positive effect on real domestic private investment ratio, DPIY, at the 1 percent and 5 percent levels of significance, respectively. To put emphasise on the key coefficient, FDIY, we find that a 1 point increase in FDIY leads to 4.51 points increase in private investment ratio. In addition to the direct contribution of FDI to total private investment, it implies that foreign firms can create some forward and/or backward linkages and thereby affect upstream and/or downstream industries. Besides, as suggested by the results from the export equation, FDI plays an important role in the exported-oriented industries. And this generates strong forward and backward linkage effects in the Thai investments. The equation also points out that private investment has the borrowing quantity constraint because the domestic credit over GDP ratio, DCY, coefficient is positive and significant. The remaining variables, i.e., real effective exchange rate, REX, and the public investment, DGIY, are not significant with positive and negative signs, respectively.

5.3 VAR Estimation Results

The former section, by using the econometric model, we were able to reject null hypotheses that "FDI has not exerted significant impact on imports, exports, and domestic private investment". The results indicate they way in which four key variables move together.

In this section, multivariate time-series approach is used in the following part. In this model, imports (M), exports (X), domestic private investment (DPI), and

foreign direct investment (FDI) are treated symmetrically and endogenously. No *a priori* restrictions, which are implied by theoretical arguments, are necessary for identification.

We first present results of the unit root tests in Table 5-2. The augmented Dickey-Fuller test procedure is used for this matter. The tests were performed on both the levels variables as well as on the first differences. In each case, the lag-length was chosen for the ADF test according to the Akaike Information Criterion (AIC). The results do not reject the null hypothesis of a unit root for all four variables at the usual significance level. The finding suggests that the annual time series of M, X, DPI, and FDI are non-stationary in levels, but have stationarity in first differences. In other words, each of these series is integrated of order one: I(1). So we apply cointegrating techniques to determine if there exists long-run relationships between imports, exports, domestic private investment, and foreign direct investment.

The next step is to determine the optimal lag lengths of the model. We estimated several unrestricted VARs in levels with different lag-lengths for the variable LM, LX, LDPI, and LFDI in order to determine the optimal lag length of the VAR. The results are presented in Table 5-3. Both the AIC and the SBC indicate that the optimal lag length is 1. Hence, the model in this study shall be VAR(1).

Table 5- 2 Test Results for Unit Roots

Variable	Test-statistic			
	Included intercept but without trend	**Included intercept and trend**	**Included intercept but without trend**	**Included intercept and trend**
LM	-1.2114*	-3.1692*	-5.0432	-4.9167
LX	-1.2686*	-3.2410*	-5.7057	-5.5789
LDPI	-1.1040*	-3.3905*	-3.9911	-4.0048
LFDI	0.4237*	-2.9280*	-3.9095	-3.7914

Legend: Variables are in logs, i.e., **LM**: log M, **LX**: log X, **LDPI**: log DPI, and **LFDI**: log FDI.

Notes: Test regressions were run both with intercept and trend and with intercept but no trend.
The critical value of the ADF t-test at 5 percent level significance for the case without trend ADF = 3.08.
The critical value of the ADF t-test at 5 percent level significance for the case with trend ADF = 3.76.
* shows that the test statistic of that variable is below its critical value at the 5 percent level of significance.

Table 5- 3 Test for the Order of VAR

Order	AIC	SBC
4	70.0568	26.3033
3	70.3113	37.4962
2	65.0623	43.1855
1	71.0611*	60.1227*
0	-57.0611	-57.4386

Notes: a) AIC = Akaike Information Criterion; SBC = Schwartz Bayesian Criterion.
b) * denotes maximum value of the statistic.

We then use the multivariate cointegration techniques developed by Johansen and Juselius to detect the numbers of cointegrating vectors r binding the variables together. Table 5-4 presents the test results. Both the trace and maximum eigenvalue test statistics indicate that the number of cointegrating vectors is two.

Table 5- 4 Johanson Tests for Cointegration

H_0: Number of Cointegrating Vectors	Test Statistic	5% Critical Value	Reject H_0 At 5% ?
Panel A: Results of Trace Test			
r <= 3	7.56	20.18	No
r <= 2	21.14	34.87	No
r <= 1	86.33	53.48	Yes
r <= 0	127.59	75.98	Yes
Panel B: Results of Maximum Eigenvalue Tests			
r <= 3	7.34	15.87	No
r <= 2	12.09	22.04	No
r <= 1	53.61	28.27	Yes
r <= 0	167.82	34.40	Yes

Finally, since the levels variables are non-stationary, the vector error-correction model (VECM) is applied. The VECM is, in essence, a VAR model that incorporates an error-correction term. The inclusion of an error-correction term in VAR model allows the estimated model to reflect long-run equilibrium constraints, while, at the same time, permitting flexibility in the short-run dynamics captured by the VAR (Wilamoski and Tinkler, 1999). Besides, the VECM or a cointegrating vector autoregressions (VAR) is preferable to unrestricted VAR when variables in the VAR are cointegrated (Gounder and Sen, 1999).

Because the cointegrating vectors bind the long-run behaviour of the variables, the VECM procedure is expected to produce results in the impulse response analysis and forecast error variance decomposition that more accurately reflect the relationship between the variables than the standard unrestricted VAR one.

5.3.1 Impulse Response Functions Results

Figures 5.1 to 5.4 plot the orthogonalised impulse response functions (IRFs) showing the dynamic responses of the endogenous variables to a one-standard deviation innovation in each of the four structural shocks. In the discussion, a shock means positive shock, unless stated otherwise. The horizontal axis in these diagrams represents time, starting from the first year and extending to 10 years. The dashed lines serve as a reference-line since they indicate zero responses. The IRFs exhibit the following features:

In general, the response for the change in the four variables mentioned above converge towards zero or a negligibly small number in the eighth year.

In Figure 5-1, a positive import shock has a negative effect on exports, domestic private investment, and foreign direct investment. Foreign direct investment appears to recover faster than exports and domestic private investment. After three years below its pre-shock level, foreign direct investment gradually increased in year four, to remain over the pre-shock level for five years.

Domestic private investment and exports had almost exactly the same response. After a decrease in the first year following the shock, they recovered in the second year. However, they stayed below the pre-shock level for six years, prior to returning to their initial levels in year seven.

With reference to Figure 5-2, a positive export shock increases import, domestic private investment, and foreign direct investment in the first year. In year two FDI starts steadily declining until it reaches its initial stage in year eighth. Domestic private investment and exports had a similar response to the shock; after reaching their peak in year two, they gradually decline and return to the beginning point.

The dynamic effects of a disturbance generated by a domestic private investment shock are depicted in Figure 5-3. An appreciation of domestic private investment reduces FDI below its pre-shock level for a period of nine years. After the shock, imports increase for the first two years. For the next three to four years, imports gradually decline to a point just below that of the pre-shock level, before finally returning to its original value at year nine. Similarly, exports increase in the first year, and then follow a pattern resembling that of imports.

A foreign direct investment shock derives less impact to the other macroeconomic variables: import, export, and domestic private investment shocks (Figure 5-4). Exports and Imports are hardly affected by this positive shock, while domestic private investment briefly increased for a couple of years before returning to its pre-shock level in the eighth year.

Figure 5- 1

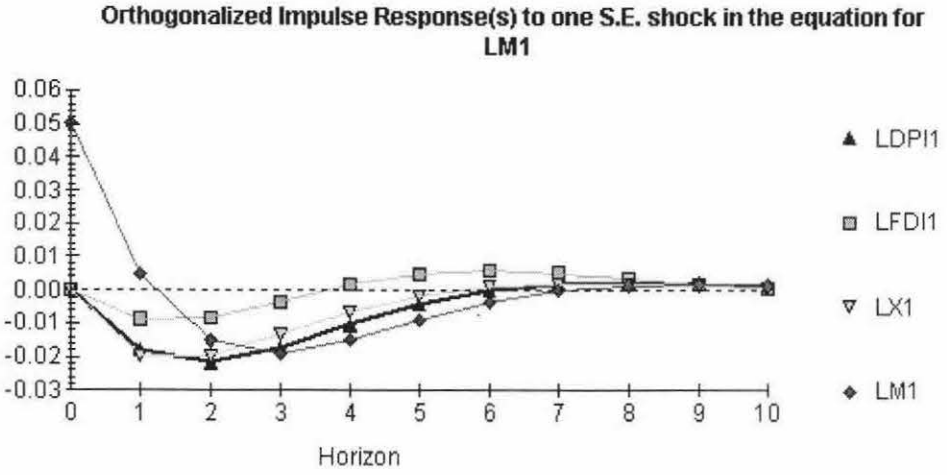


Figure 5- 2

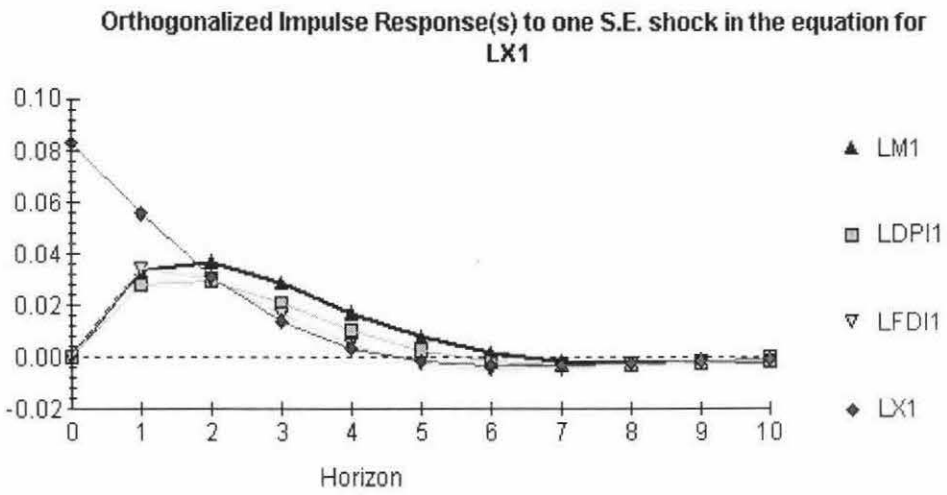


Figure 5- 3

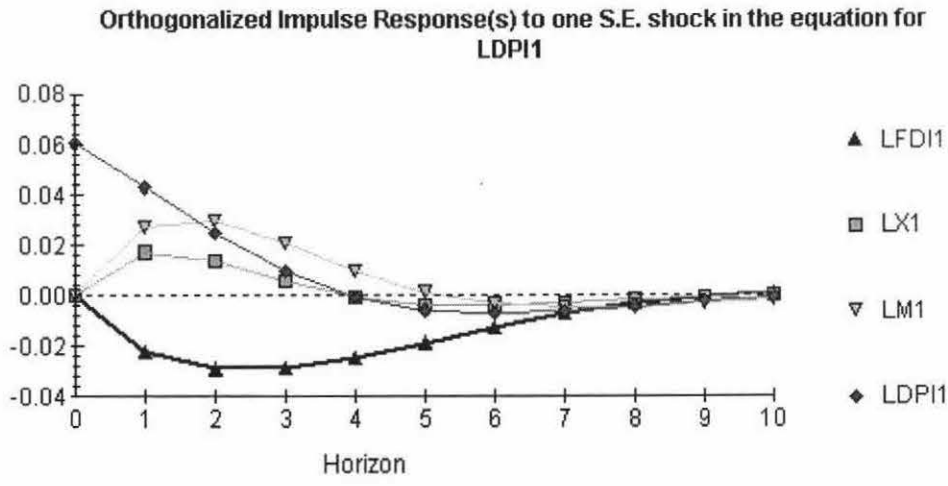
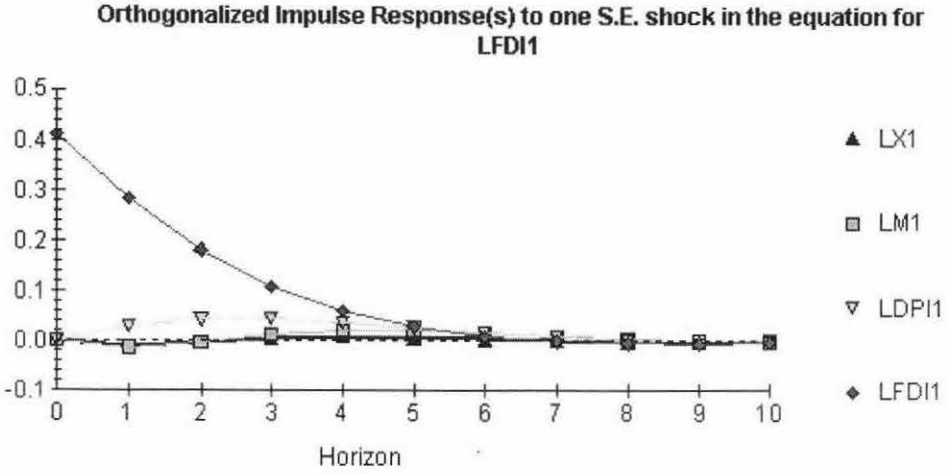


Figure 5- 4



5.3.2 Forecast Error Variance Decomposition Results

Variance decomposition (FEV) estimates the forecast error components of one variable originating from the generalised innovations of the system. Table 5-5 presents the ranges of these results. These results confirm the idea mentioned in Chapter 3. The summarised results are for the first to the fifteenth-step ahead forecasts.

Table 5- 5 Generalised Forecast Error Variance Decomposition Results[6]

Percentage of FEV accounted for by innovation in				
Variable	LM	LX	LDPI	LFDI
LM	80.2-51.9	19.6-28.3	43.6-33.9	15.8-19.3
LX	5.6-6.3	92.8-86.6	0.0-0.5	3.4-3.8
LDPI	35.8-23.0	7.9-13.8	83.3-49.8	22.1-45.8
LFDI	21.3-19.5	5.2-6.1	6.2-5.3	99.2-97.6

Legend: **LM**: log M, **LX**: log X, **LDPI**: log DPI, and **LFDI**: log FDI

From Table 5.5, it will be noticed that between 83% and 50% of the FEV of the DPI is accounted for by own innovations, between 8% and 14% by innovations

[6] "The results will add up to unity ONLY in the case of the Orthogonalised forecast error variance decomposition, but not in the case of the Generalised forecast error variance decomposition." (Personal contact with Prof. Hashem Pesaran, 24 April 2000).

in X, between 36% and 23% by innovations in M, and between 46% and 22% by innovations in FDI.

From these results, it can be inferred that whereas the lagged values of domestic private investment are obviously important for predicting current and future values of domestic private investment, the lagged values of foreign direct investment, imports, and exports (in that order of importance) do help to improve the accuracy with which domestic private investment can be predicted.

With respect to imports, between 80% and 52% of the FEV is accounted for by own innovations, between 44% and 34% by innovations in domestic private investment, between 20% to 28% by innovations in exports, and between 16% and 20% by innovations in foreign direct investment.

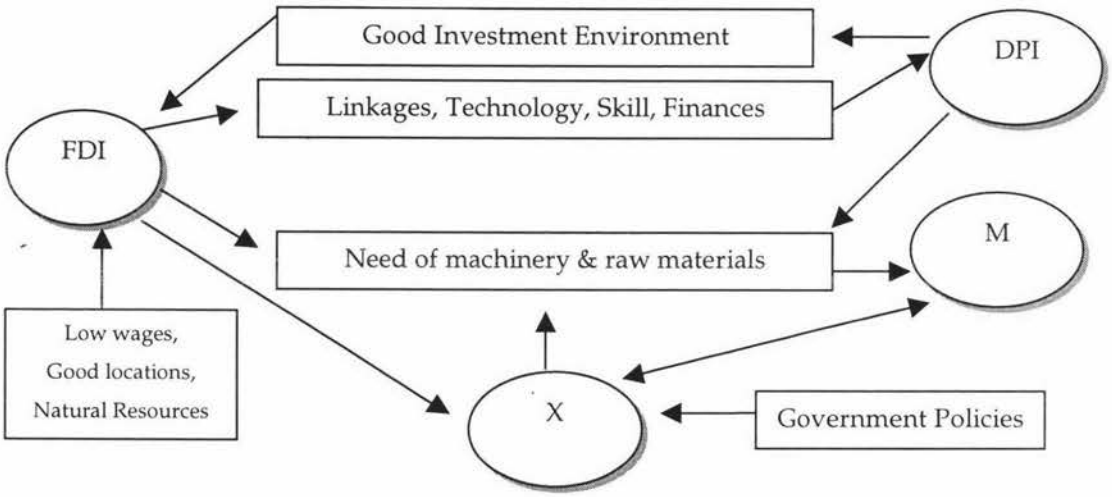
The own innovations of exports account for between 93% and 87% of that variable's FEV; and up to 0.5% of the FEV of X is accounted for by innovations in domestic private investment, while up to 6% and up to 4% of the FEV of X, are accounted for by innovations in imports and foreign direct investment. respectively.

For foreign direct investment, between 21% and 19% of the FEV of the FDI is accounted for by innovations in M, and up to 6% by innovations in X and M, but between nearly 100% and 98% by own innovations. From these extremely high values, we can surmise that foreign direct investment depends overwhelmingly on its own lagged values and much less so on the lagged values of imports and exports.

Overall, we can clearly see that exports and foreign direct investment mainly depend on its own past value, while imports and domestic private investment not only depend on their past values but also on the other variables which

influence them as well. The reasons behind these might be explained by an inter-relation between trade and investment chart shown in Figure 5-5.

Figure 5- 5 Inter-relation between Trade and Investment



In Figure 5-5, we start from an increase in foreign direct investment inflow that creates backward and/or forward linkages in domestic industries. Because of these linkages, as well as because of other advantages brought by FDI, such as high technology and new financial connections, domestic investors have more chances to invest in many kinds of businesses. Certainly, the new factories, belonging to either foreign investors or to domestic investors, need machinery and raw materials to produce their products. This leads to an increase in imports. In addition, many industries are export-oriented industries as there are some government policies of export promotion. One of the effects of an increase in exports is an increase in imports. Some raw materials may need to be imported. Furthermore, besides the low wages, good location, and abundance of natural resources, domestic private investment is one of the key indicators about investment environment. If there is much domestic investment, it means the nation has a good enough situation and this can also attract foreign investment.

5.4 Conclusion

This chapter has presented the results of an econometric analysis of the impact of foreign direct investment on Thailand's trade (imports and exports) and domestic private investment by using annual data covering the period 1965 to 1997.

By using an auto regressive distributed lag (ARDL) method, the study has shown that foreign direct investment has a strong positive effect on the key sectors.

Furthermore, vector error correction model (VECM), which is a variant of the VAR, was conducted to examine the relationships among the variables. Impulse response functions and forecast error variance decompositions were estimated and analysed.

Impulse response functions, which allow the dynamic nature of the relationships among imports, exports, domestic private investment, and foreign direct investment to be observed, show that an increase in each variable does have an impact on others. On average, the impact will last for eight years.

The empirical results from forecast error variance decomposition analysis also indicate that imports, exports, domestic private investment, and foreign direct investment have inter-relations among themselves. However, exports seem to be the most independent variable as they depend mainly on past values.

The results from the empirical analysis confirm our idea of how foreign direct investment affects domestic private investment and trade. As mentioned in Chapter 3, an increase in the inflow of FDI leads to an increase in imports, exports, and domestic private investment.

CHAPTER 6

CONCLUSION AND FURTHER RESEARCH

The objective of this study was to investigate the macroeconomic impact of foreign direct investment (FDI) on domestic private investment and trade in Thailand. The empirical results are estimated over the period from 1965 to 1997.

The questions answered in this research are (i) "Has FDI contributed any impact on the imports, exports, and domestic private investment?" and (ii) "Has this had a positive or negative effect on the Thai economy?". The estimation uses the autoregression distributed lag method (ARDL). Furthermore, a vector error correction model (a variant of vector autoregression) was used to examine the question: "Is there any inter-relation between these explanatory variables?".

6.1 Chapter Summary and Conclusion

Chapter 1 provided a brief description of private foreign investment and foreign direct investment. This is followed by an explanation of the background, the importance, the data, and the method of study.

FDI is a popular research topic and there are many studies and researches related to it. Chapter 2 provided a review of the literature concerning the theories and empirical evidence of FDI, i.e., the theories of FDI determinants, the two important trade-theoretical approaches, the macroeconomic impact of FDI, and some empirical findings from former researches.

Chapter 3 contained a brief introduction of Thailand and the background to the Thai economy. This was followed by the role of foreign investment, and trend and pattern of FDI in Thailand. At the end of the chapter, the macroeconomic contribution of FDI in Thailand was presented.

Chapter 4, one of the core chapters, showed the three-single equations used in the study. The methods of ARDL and VECM were described, and sources of data were shown.

The macroeconomic-empirical results of the impact of FDI on Thailand's trade and domestic private investment were discussed in Chapter 5. The analysis showed a consistency with the macroeconomic impact of FDI and with the finding and theory in Chapters 2 and 3.

In the context of the macroeconomic impact of FDI, one of the findings indicates that FDI significantly stimulates domestic private investment, similar to the findings of Jansen (1995). The empirical result showed that each 1 point increase in FDI to GDP ratio has induced 4.51 point of domestic private investment to GDP ratio. This implies that FDI can create forward and/or backward linkage effects to the local investment. For imports, the empirical result also showed that an increase in FDI will lead to an increase in imports. The findings on the export side showed that FDI has an insignificant effect on exports.

The findings from the inter-relation investigation, i.e., the impulse response functions and the forecast error variance decompositions, showed that all the explanatory variables have influences on one another.

6.2 Limitations of the Study and Suggestions for Further Research

The macroeconomic impact on an aggregate FDI is investigated in this study. It is suggested that future research should emphasise the study of the impact of FDI on different economic sectors, since FDI may impact in different ways on different sectors of the economy. The impact of FDI on different industries with in a sector, or regions, of a country which leads to regional imbalances and comparison between LDCs can be undertake as further research.

APPENDIX A
SUPPORTING TABLES

Table A- 1 Selected Macroeconomic Indicator: Thailand, 1965-1997

Unit: Millions Baht

YEAR	FDI**	Y*	GDI*	S*	M***(cif)	X***(fob)
1965	870	91800	17360	n.a.	15433	12941
1966	571	109396	23942	n.a.	18504	14310
1967	894	117446	27458	n.a.	22187	14166
1968	1240	126457	31200	n.a.	24103	13679
1969	1058	139129	35921	n.a.	26891	14722
1970	891	147400	37731	n.a.	27009	14722
1971	808	153400	37116	33619	26794	17281
1972	1427	170100	36872	35881	30875	22491
1973	1605	222100	59958	58877	42184	32226
1974	3836	279200	74365	72711	64064	50325
1975	1745	303300	81134	68818	66835	48438
1976	1614	346500	83109	74430	72879	60797
1977	2164	403500	108480	86389	94177	71198
1978	1135	488200	137496	114526	108899	83065
1979	1128	558900	152050	110305	146161	108197
1980	3878	662482	193060	150953	193618	133197
1981	6414	760356	225638	170722	215026	153001
1982	4331	841569	223155	201147	196616	159728
1983	8225	920989	276069	210051	236609	146471
1984	9644	988070	291215	242546	245155	175237
1985	4442	1056496	298404	257872	251169	193366
1986	6908	1133397	293236	300121	241358	233383
1987	9044	1299913	362347	355482	334209	299853
1988	27964	1559804	508354	468116	513114	403569
1989	45698	1856992	651175	586941	662679	516315
1990	64695	2191094	899914	713616	852982	589813
1991	51389	2519618	1063351	854950	959408	725449
1992	53764	2833277	1122723	962453	1033245	824643
1993	41874	3161374	1265005	1086306	1170846	940863
1994	14954	3600907	1484544	1239713	1369260	1137602
1995	49887	4194600	1742800	1462100	1763591	1406310
1996	57472	4689600	1919000	1524500	1832825	1411039
1997	117689	4724107	1835200	1530400	1924263	1806682

Sources: * data from National Account Division, NESDB

** data from BOT

*** data from Department of Business Economics, Ministry of Commerce

Table A- 2 Gross Domestic Product at Current Market Prices by Industrial Origin, 1965 - 1997

Unit: Million Baht

Industry	1965	1966	1967	1968	1969
Agriculture	**26,961**	**34,062**	**31,592**	**33,193**	**36,542**
Crops	20,406	27,202	23,443	23,622	26,642
Livestock	3,270	3,454	4,033	4,649	4,749
Fisheries	1,077	1,303	1,726	2,208	2,566
Forestry	2,208	2,104	2,390	2,714	2,584
Agricultural Services*					
Simple Agricultural Processing Products**					
Non-agriculture	**64,840**	**75,334**	**85,854**	**93,262**	**102,859**
Mining and Quarrying	1,479	1,636	1,763	1,834	2,118
Manufacturing	15,149	17,593	21,075	22,577	25,747
Construction	3,764	4,941	5,949	6,354	6,582
Electricity and Water Supply	681	903	1,084	1,325	1,422
Transportation and Communication	5,876	6,219	6,791	7,186	7,499
Wholesale and Retail Trade	15,430	18,904	20,973	22,460	24,870
Banking, Insurance and Real Estate	1,479	1,882	2,273	2,675	3,197
Ownership of Dwellings	5,941	6,316	6,711	7,003	7,448
Public Administration and Defence	3,926	4,172	4,741	5,517	6,090
Services	11,115	12,768	14,494	16,331	17,886
Gross Domestic Product	**91,800**	**109,396**	**117,446**	**126,457**	**139,129**
Industry	1970	1971	1972	1973	1974
Agriculture	**38,449**	**37,016**	**43,495**	**61,809**	**75,948**
Crops	24,253	21,831	26,594	41,341	50,589
Livestock	4,328	4,657	4,925	4,847	8,009
Fisheries	2,688	2,992	3,635	4,482	4,237
Forestry	2,479	2,485	2,657	3,821	4,487
Agricultural Services	1,047	1,288	1,587	2,120	2,773
Simple Agricultural Processing Products	3,655	3,762	4,096	5,199	5,852
Non-agriculture	**109,832**	**117,453**	**127,967**	**162,531**	**206,145**
Mining and Quarrying	2,320	2,455	2,535	2,715	3,813
Manufacturing	23,934	27,428	31,886	43,426	54,456
Construction	6,608	6,749	6,734	7,579	9,042
Electricity and Water Supply	1,646	1,958	2,319	2,761	3,089
Transportation and Communication	8,443	9,121	9,871	11,802	14,438
Wholesale and Retail Trade	28,716	28,093	29,363	41,400	55,948
Banking, Insurance and Real Estate	3,752	4,126	4,407	5,794	7,808
Ownership of Dwellings	8,477	9,074	9,529	10,736	12,579
Public Administration and Defence	6,723	7,253	7,882	9,133	11,451
Services	19,213	21,196	23,441	27,185	33,521
Gross Domestic Product	**148,280**	**154,468**	**171,461**	**224,340**	**282,091**

(Continued over)

Table A- 2 Gross Domestic Product at Current Market Prices by Industrial Origin, 1965 - 1997

(Continued)

Industry	1975	1976	1977	1978	1979
Agriculture	**82,097**	**93,080**	**100,861**	**120,459**	**135,088**
Crops	55,069	62,080	62,489	76,977	85,618
Livestock	8,370	9,155	11,645	11,036	13,721
Fisheries	5,280	5,876	8,087	10,645	9,735
Forestry	4,341	5,776	6,168	7,411	9,400
Agricultural Services	3,228	3,395	3,941	4,681	4,480
Simple Agricultural Processing Products	5,809	6,799	8,532	9,710	12,135
Non-agriculture	**225,268**	**256,846**	**305,798**	**370,524**	**427,492**
Mining and Quarrying	3,485	4,508	6,544	8,794	9,795
Manufacturing	57,675	69,437	82,926	99,450	119,769
Construction	9,799	12,757	16,665	20,617	22,824
Electricity and Water Supply	3,463	3,974	4,950	5,743	6,586
Transportation and Communication	15,473	18,616	20,579	25,309	29,656
Wholesale and Retail Trade	61,628	65,802	78,652	95,655	102,621
Banking, Insurance and Real Estate	8,251	9,131	10,985	14,045	16,809
Ownership of Dwellings	13,477	14,887	16,408	17,819	19,712
Public Administration and Defence	13,371	14,683	16,340	19,834	23,489
Services	38,646	43,051	51,749	63,258	76,231
Gross Domestic Product	**307,366**	**349,927**	**406,659**	**490,983**	**562,580**
Industry	1980	1981	1982	1983	1984
Agriculture	**153,960**	**162,390**	**156,098**	**184,752**	**173,642**
Crops	100,705	104,246	98,719	119,679	110,438
Livestock	17,077	17,466	15,283	20,178	17,696
Fisheries	8,350	10,720	10,946	12,408	11,860
Forestry	8,775	9,695	8,846	9,338	9,692
Agricultural Services	5,691	6,901	7,270	7,783	8,073
Simple Agricultural Processing Products	13,362	13,362	15,034	15,366	15,883
Non-agriculture	**508,072**	**597,966**	**682,471**	**736,237**	**814,428**
Mining and Quarrying	11,727	11,208	13,416	14,106	18,543
Manufacturing	142,054	172,143	176,438	203,837	226,360
Construction	29,383	34,696	39,890	46,632	52,427
Electricity and Water Supply	6,373	10,814	15,601	17,093	18,609
Transportation and Communication	34,894	41,648	54,350	56,613	65,078
Wholesale and Retail Trade	116,711	138,594	161,738	152,380	175,026
Banking, Insurance and Real Estate	20,503	21,833	25,542	30,875	33,491
Ownership of Dwellings	22,682	26,344	30,922	35,732	39,728
Public Administration and Defence	30,718	33,361	39,815	44,704	45,090
Services	93,027	107,325	124,759	134,265	140,076
Gross Domestic Product	**662,482**	**760,356**	**841,569**	**920,989**	**988,070**

(Continued over)

Table A- 2 Gross Domestic Product at Current Market Prices by Industrial Origin, 1965 - 1997

(Continued)

Industry	1985	1986	1987	1988	1989
Agriculture	**167,026**	**177,537**	**204,521**	**252,346**	**279947**
Crops	103,532	104,237	120,750	157,783	175234
Livestock	15,927	20,752	23,725	26,022	29876
Fisheries	13,115	15,634	20,115	25,254	27461
Forestry	9,497	9,985	11,045	10,489	8518
Agricultural Services	8,663	8,695	8,824	9,835	10678
Simple Agricultural Processing Products	16,292	18,270	20,062	22,963	28180
Non-agriculture	**894,470**	**955,860**	**1,095,392**	**1,307,458**	**1,577,045**
Mining and Quarrying	25,962	19,753	22,221	26,599	31885
Manufacturing	231,598	270,605	315,291	403,034	496714
Construction	53,903	55,715	62,641	74,449	102123
Electricity and Water Supply	24,955	28,888	33,279	35,298	42466
Transportation and Communication	78,075	88,202	99,344	116,611	138084
Wholesale and Retail Trade	198,810	189,986	223,129	266,257	309816
Banking, Insurance and Real Estate	35,271	37,102	49,980	66,220	84668
Ownership of Dwellings	43,934	47,899	51,773	55,416	60457
Public Administration and Defence	48,679	50,681	52,726	56,488	64621
Services	153,283	167,029	185,008	207,086	246211
Gross Domestic Product	**1,056,496**	**1,133,397**	**1,299,913**	**1,559,804**	**1856992**
Industry	1990	1991	1992	1993	1994
Agriculture	**272,935**	**317,085**	**348,127**	**329,878**	**390,233**
Crops	157,942	181,918	197,058	166,564	206,264
Livestock	32,850	37,430	35,001	32,275	35,802
Fisheries	32,218	43,139	55,764	67,410	76,138
Forestry	7,376	7,110	6,705	6,443	6,145
Agricultural Services	10,793	10,958	11,525	11,149	12,477
Simple Agricultural Processing Products	31,756	36,530	42,074	46,037	53,407
Non-agriculture	**1,900,095**	**2,189,650**	**2,482,787**	**2,840,571**	**3,240,572**
Mining and Quarrying	34,835	39,372	42,306	44,259	48,654
Manufacturing	594,003	707,901	778,987	892,369	1,017,062
Construction	136,235	168,378	190,529	220,771	267,191
Electricity and Water Supply	47,746	53,461	65,506	75,739	84,510
Transportation and Communication	156,566	177,239	205,216	237,771	269,307
Wholesale and Retail Trade	386,273	426,957	477,030	530,904	598,673
Banking, Insurance and Real Estate	120,551	133,838	182,180	232,191	282,216
Ownership of Dwellings	66,041	70,966	75,435	81,247	88,795
Public Administration and Defence	66,041	86,925	105,392	117,682	127,526
Services	291,804	324,613	360,206	407,638	456,638
Gross Domestic Product	**2,183,545**	**2,506,635**	**2,830,914**	**3,170,258**	**3,630,805**

(Continued over)

Table A- 2 Gross Domestic Product at Current Market Prices by Industrial Origin, 1965 - 1997

(Continued)

Industry	1995	1996	1997	Notes
Agriculture	**464,171**	**510,400**	531,782	*Induced in Crops for the year between 1965-1969
Crops	258,432	292,637	303,927	
Livestock	42,599	43,929	42,057	
Fisheries	83,097	87,893	99,750	** Induced in Manufacturing for the year between 1965-1969
Forestry	6,098	5,969	5,657	
Agricultural Services	12,779	13,480	13,354	
Simple Agricultural Processing Products	61,166	66,492	67,037	
Non-agriculture	**3,724,103**	**4,098,091**	**4,192,325**	
Mining and Quarrying	50,468	62,387	86,457	
Manufacturing	1,180,047	1,298,817	1,333,272	
Construction	304,178	343,873	270,461	
Electricity and Water Supply	99,248	106,711	110,940	
Transportation and Communication	304,178	341,693	366,260	
Wholesale and Retail Trade	680,402	720,058	774,188	
Banking, Insurance and Real Estate	316,203	346,874	324,146	
Ownership of Dwellings	99,338	109,279	121,675	
Public Administration and Defence	154,654	167,888	175,804	
Services	535,387	600,511	629,122	
Gross Domestic Product	**4,188,929**	**4,608,491**	**4,724,107**	

Source: NESDB, complied by Bank of Thailand

Table A- 3 GDP growth and ratio of imports, exports, domestic private investment, and foreign direct investment to GDP

YEAR	YG	MY	XY	DPIY	FDIY
1965	8.2	18.1	15.3	12.5	10.3
1966	11.1	18.1	14.1	13.4	5.6
1967	8.6	20.4	13.1	15.4	8.3
1968	8.1	20.5	11.7	15.7	10.6
1969	6.6	20.8	11.4	16.3	8.2
1970	11.4	19.8	10.9	16.7	6.5
1971	4.9	18.5	11.9	16.6	5.6
1972	4.3	18.8	13.7	16.0	8.7
1973	10.2	19.2	14.7	17.3	7.4
1974	4.5	23.8	18.7	19.6	14.3
1975	5.0	22.5	15.2	17.7	5.9
1976	9.3	21.6	18	16.1	4.8
1977	9.8	24.0	18.1	18.6	5.5
1978	10.3	23.2	17.7	17.6	2.4
1979	5.4	26.3	19.4	18.0	2.0
1980	5.2	28.3	19.4	18.9	5.7
1981	5.9	27.9	19.5	19.0	8.2
1982	5.4	23.2	18.9	19.1	5.1
1983	5.6	25.6	15.8	20.5	8.9
1984	5.8	24.7	17.7	20.3	9.7
1985	4.6	24.8	19.1	18.5	4.4
1986	5.5	22.0	21.1	18.4	6.3
1987	9.5	25.7	23.2	21.7	7.0
1988	13.3	32.9	25.9	25.6	17.9
1989	12.2	35.7	27.8	29.6	24.6
1990	11.2	38.7	27	34.2	29.6
1991	8.6	38.1	28.9	34.4	20.5
1992	8.1	36.4	29.1	31.1	19.0
1993	8.4	36.7	29.4	31.6	13.2
1994	8.9	37.7	31.3	31.3	6.0
1995	8.8	42.0	33.5	32.2	7.0
1996	5.5	39.3	30.3	30.8	7.6
1997	-0.4	39.9	37.4	24.1	21.9

Source: author's calculation

Table A- 4 Net Flows of FDI in Thailand Classified by Countries, 1965 - 1997

(Unit: Million Baht)

Countries	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
Japan	322.0	237.2	160.2	181.1	404.3	322.1	263.6	340.8	707.7	749.6	423.6
U.S.	328.8	215.1	509.3	687.9	476.3	351.9	341.1	619.6	307.7	1675.1	819.1
NIEs	0	13.4	79.5	93.0	56.8	70.1	45.4	90.9	254.2	512.9	74.6
Hong Kong	0	13.4	56.6	90.3	47.4	69.0	46.8	87.6	248.7	489.9	59.8
Taiwan	0	0	22.9	2.7	9.4	0.5	9.3	2.6	3.2	20.4	2.1
South Korea	0	0	0	0	0	0.6	-10.7	0.7	2.3	2.6	12.7
ASEAN	0	6.6	1.3	18.2	2.6	-4.6	36.4	48.6	83.6	442.8	49.0
Singapore	0	0	0.4	10.3	1.4	-0.7	20.3	16.0	76.6	330.3	53.3
Others	0	6.6	0.9	7.9	1.2	-3.9	16.1	32.6	7.0	112.5	-4.3
EU	44.3	57.4	100.1	201.2	76.3	64.5	53.1	210.5	309.6	348.4	266.1
U.K.	44.3	28.5	31.2	21.9	26.1	40.7	19.2	130.8	78.3	196.0	109.7
Germany	0	13.1	20.8	30.3	3.9	10.6	6.7	18.0	20.9	13.4	13.0
Others	0	15.8	48.1	149.0	46.3	13.2	27.2	61.7	210.4	139.0	143.4
Others Countries	175.2	40.9	44.0	58.3	41.2	86.5	68.8	116.7	-57.9	107.6	112.4
Total	870.3	570.6	894.4	1239.7	1057.5	890.5	808.4	1427.1	1604.9	3836.4	1744.8

(Continued over)

Table A- 4 Net Flows of FDI in Thailand Classified by Countries, 1965 - 1997

(Continued)

Countries	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Japan	424.2	803.8	686.7	245.9	902.9	1407.0	1037.3	2431.9	2588.1	1534.0	3049.0
U.S.	445.1	492.4	624.2	226.5	732.4	2395.8	857.3	1265.9	3733.2	2387.5	1293.7
NIEs	93.6	205.0	-224.4	315.6	1125.3	335.3	595.4	919.8	401.7	816.2	1098.9
Hong Kong	88.1	197.6	-235.7	284.9	1113.7	323.3	593.4	870.9	351.8	649.0	955.7
Taiwan	-4.3	0.2	1.2	1.9	1.9	11.9	2.0	28.3	45.0	170.6	132.6
South Korea	9.8	7.2	10.1	28.8	9.7	0.1	0	20.6	4.9	-3.4	4.6
ASEAN	293.6	106.6	25.3	-5.3	431.0	1042.7	-366.6	712.8	1170.1	-1082	361.7
Singapore	308.9	104.8	15.0	-24.2	277.3	1018.8	-387.5	556.1	1121.3	-1121.9	403.1
Others	-15.3	1.8	10.3	18.9	153.7	23.9	20.9	156.7	48.8	39.9	-41.4
EU	350.6	452.4	228.0	332.7	535.4	776.8	1489.4	2117.7	374.6	425.6	508.9
U.K.	176.6	182.9	65.6	103.7	82.5	334.8	182.1	793.4	257.1	121.6	251.7
Germany	82.0	90.1	-21.6	184.7	261.8	179.1	182.2	236.9	18.3	166.3	160.3
Others	92.0	179.4	184.0	44.3	191.1	262.9	1125.1	1087.4	99.2	137.7	96.9
Others Countries	7.0	103.7	-205.0	12.1	151.2	456.8	718.6	776.8	1375.9	360.5	601.9
Total	1614.1	2163.9	1134.8	1127.5	3878.2	6414.4	4331.4	8224.9	9643.6	4441.8	6908.1

(Continued over)

Table A- 4 Net Flows of FDI in Thailand Classified by Countries, 1965 - 1997

(Continued)

Countries	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Japan	3268.7	14607.6	18761.6	27931.0	15593.3	8572.0	7733.0	3091.2	13855.8	13250.3	42380.0
U.S.	1815.6	3184.7	5220.3	6154.0	5918.6	12084.4	7235.9	3908.8	6471.2	10870.0	25837.0
NIEs	1505.7	6235.4	11032.2	14674.8	14614.9	17097.6	6503.8	10401.0	9661.4	9564.1	20318.0
Hong Kong	796.2	2794.5	5715.7	7027.4	11565.5	14614.4	4898.4	8004.2	6948.2	5443.9	14813.0
Taiwan	687.2	3136.3	5062.3	7159.9	2753.5	2220.8	1236.6	2073.8	2405.0	3491.8	4591.0
South Korea	22.3	304.6	254.2	487.5	295.9	262.4	368.8	323.0	308.2	628.4	914.0
ASEAN	530.8	1646.9	2751.5	6665.5	6576.2	7170.4	1521.7	4917.6	3987.8	7802.2	10679.0
Singapore	535.6	1572.0	2688.0	6135.8	6469.3	6722.5	1545.1	4629.6	3393.5	6968.7	9853.0
Others	-4.8	74.9	63.5	529.7	106.9	447.9	-23.4	288.0	594.3	833.5	826.0
EU	940.2	2248.4	3818.8	4212.1	3964.2	6911.5	6602.9	2636.3	3778.9	4162.2	10713.0
Germany	448.1	621.3	817.6	1150.0	842.5	617.8	633.8	743.0	951.3	1063.9	2101.0
Others	163.2	742.2	2778.9	1931.6	2865.0	3062.4	1892.0	778.8	1447.4	1665.8	4916.0
Others Countries	982.8	40.5	4113.1	5057.6	4721.9	1928.4	14725.2	8285.1	12131.0	11821.2	7762.0
Total	9043.8	27963.5	45697.5	64695.0	51389.1	53764.3	44322.5	33240.0	49886.1	57470.0	117689.0

Source: Bank of Thailand, Complied by Board of Investment, *Foreign Investment Situation* (various issues).

Table A- 5 Net Flows of FDI in Thailand Classified by Economic Sector, 1965 - 1997

(Unit: Percent)

Sector	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Financial Institutions	5.8	6.1	8.9	10.6	33.3	22.5	13.5	28	-0.5	-48.5	-4.5	10.5	-11.1	12.1
Trade	26.3	37.5	23.3	27.8	5.9	31.3	27	14.2	30.7	30.3	19.4	7.5	16.1	20.6
Construction	10.5	27.5	22.1	8.3	2.5	9.7	9.4	10.5	16.8	26.1	20.2	19.9	17.0	9.0
Mining&Quarrying	2.1	6.5	12	2.7	30.7	3.6	5.4	4.2	5.9	13.7	15.4	12.0	38.8	17.7
Agriculture	0	0	0.3	0.3	0.4	0.1	0.1	0	-1.6	0.4	5.4	0.1	0.4	0.6
Manufacturing	50.2	13.7	21.7	37.9	26.9	33.3	28.4	30.4	41	64.2	26.1	39.4	28.4	31.2
• Food	5.1	1.5	0.4	1.7	6.2	4.7	1.9	2.9	1.5	4.6	2.4	2.4	-5.9	2.6
• Textile	15.6	4.3	12.6	27	9.9	11	9.8	19.2	11.3	-0.9	0.0	-0.5	9.7	0.2
• Metal based and Non-metallic	1.3	1.9	0.2	0.2	3.1	1.3	0.3	0.1	2.9	2.9	1.2	2.3	2.9	12.4
• Electrical Appliances	2.1	3.5	3.2	2.3	2.9	6.3	8	5.8	16.7	31.2	11.6	9.7	15.4	4.8
• Machinery&Transport Equipment	2.5	0.6	-1.9	1.3	1.5	0.1	0	7.4	2.9	5.3	2.4	2.0	5.2	5.1
• Chemical	8.8	-5.4	4.8	7	1.7	5.2	8.5	-0.1	5.8	6.5	5.5	2.8	2.5	4.3
• Petroleum Products	11.2	6.2	1.5	-2.1	-0.5	2.5	0	-6.5	5.9	11.2	0.1	19.4	-3.0	0.0
• Construction Materials	0.5	0.3	0.6	0.5	0.7	0.4	0	0.2	-8.8	-2.6	0.0	0.2	0.2	0.2
• Other Industries	3.1	0.8	0.3	0.4	1.4	1.8	-0.1	1.4	2.8	6	3.0	1.0	1.5	1.6
Services	5.1	8.7	11.7	12.4	0.3	-0.5	16.2	12.7	7.7	13.8	18.0	10.6	10.3	8.7
Others	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table A- 5 Net Flows of FDI in Thailand Classified by Economic Sector, 1965 - 1997

(Continued)

Sector	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Financial Institutions	1.6	-28.5	7.4	4.9	9.2	6.2	7.0	13.3	12.2	3.7	0.5	1.3	3.2	3.2
Trade	19.6	24.5	25.8	9.4	13.9	14.9	20.0	15.0	13.2	12.7	25.8	22.3	24.0	28.8
Construction	11.1	35.9	17.9	14.9	6.6	8.6	5.1	6.4	27.1	8.8	5.3	1.8	3.1	4.9
Mining&Quarrying	28.9	11.7	3.5	2.1	1.7	1.3	1.8	4.0	5.8	7.2	3.9	2.8	0.9	0.6
Agriculture	0.7	1.7	2.9	3.2	1.1	1.3	1.2	1.2	-0.3	0.8	-0.5	0.5	0.1	0.0
Manufacturing	32.8	30.6	30.7	52.5	57.8	47.8	47.9	46.4	17.2	26.1	38.7	28.3	31.2	49.6
• Food	1.8	8.8	4.2	4.8	3.8	4.3	2.5	3.0	2.4	2.2	3.3	2.0	2.0	5.9
• Textile	4.7	1.4	1.2	11.0	4.0	1.5	2.7	22	2.7	-0.5	2.6	1.9	2.2	1.3
• Metal based and Non-metallic	0.8	-2.9	-0.3	4.0	7.6	6.0	4.5	4.3	3.2	5.5	3.4	4.6	5.0	5.6
• Electrical Appliances	10.8	6.3	8.9	12.6	22.6	19.4	16.5	17.5	11.0	8.2	4.5	11.7	10.5	15.7
• Machinery&Transport Equipment	1.2	0.7	-0.2	1.8	2.3	2.4	3.8	4.5	2.0	3.6	0.9	7.2	4.8	10.9
• Chemical	2.9	11.1	7.0	9.6	3.8	6.2	6.7	7.5	3.0	11.7	2.5	4.7	8.1	5.1
• Petroleum Products	9.7	0.0	0.1	-0.2	2.8	-2.6	4.7	-0.7	-12.9	11.1	2.4	-8.1	-11.0	0.4
• Construction Materials	0.1	0.9	0.1	0.1	0.1	0.2	0.0	0.3	0.7	0.3	0.4	1.3	0.2	-0.3
• Other Industries	1.5	4.3	9.8	8.8	11.0	10.4	6.5	7.9	5.1	-15.8	18.8	3.1	9.5	5.0
Services	3.3	12.1	9.7	8.3	4.0	3.5	3.2	3.2	4.0	1.1	4.2	4.4	5.5	7.7
Others	1.9	12	2.1	4.7	5.7	16.4	13.9	10.4	20.7	39.6	22.0	38.6	32.1	5.2
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Bank of Thailand, Complied by Board of Investment (various issues), *Foreign Investment Situation*.

Table A- 6 Total Investment and Total Number of Foreign Projects, both application and approved projects from Board of Investment, 1985 – 1997

Year	Total Investment of Foreign Projects (million baht)		Total Number of Foreign Projects	
	Application Projects	Approved Projects	Application Projects	Approved Projects
1985	46,010.4	23,622.8	180	117
1986	35,486.0	25,057.2	207	155
1987	163,321.8	50,063.5	630	385
1988	394,211.5	158,065.7	1273	688
1989	341,496.2	205,495.1	856	752
1990	390,927.8	205,470.0	638	616
1991	213,615.0	127,280.0	378	390
1992	169,104.0	260,062.0	263	259
1993	127,441.0	108,734.0	529	378
1994	370,649.0	147,753.0	689	507
1995	487,549.0	410,899.0	709	615
1996	417,685.0	332,593.0	648	519
1997	344,418.0	332,957.0	607	576

Source: Board of Investment (various issues), *Foreign Investment Situation*.

APPENDIX B
LIST OF VARIABLES

DCY	:	Ration of Change in domestic credit to GDP (1980 prices)
DGIY	:	Ratio of Domestic Public sector investment to GDP
DPIY	:	Ratio of Domestic Private sector investment to GDP
FDIY	:	Ratio of Net FDI inflow to GDP (1980 price)
IY	:	Ratio of Total Domestic investment to GDP
MY	:	Ratio of Imports to GDP
REX	:	Real Effective exchange rate
TTM	:	Relative prices of imports
TTX	:	Relative prices of exports
XY	:	Ratio of Exports to GDP
YG	:	Real GDP growth rate
YWG	:	Real world income growth rate

APPENDIX C

Table C- 1 Data Used in the Estimated of Econometric Model for Thailand, 1965-1997

Year	YG	FDIY	IY	DPIY	DGIY	MY	XY
1965	8.2	1.03	19.0	12.5	6.5	18.1	15.3
1966	11.1	0.56	20.0	13.4	6.6	18.1	14.1
1967	8.6	0.83	23.0	15.4	7.6	20.4	13.1
1968	8.1	1.06	23.5	15.7	7.8	20.5	11.7
1969	6.6	0.82	24.0	16.3	7.7	20.8	11.4
1970	11.4	0.65	23.8	16.7	7.1	19.8	10.9
1971	4.9	0.56	23.3	16.6	6.7	18.5	11.9
1972	4.3	0.87	22.7	16.0	6.7	18.8	13.7
1973	10.2	0.74	22.4	17.3	5.1	19.2	14.7
1974	4.5	1.43	23.3	19.6	3.7	23.8	18.7
1975	5.0	0.59	22.9	17.7	5.2	22.5	15.2
1976	9.3	0.48	22.9	16.1	6.8	21.6	18.0
1977	9.8	0.55	26.0	18.6	7.4	24.0	18.1
1978	10.3	0.24	25.3	17.6	7.7	23.2	17.7
1979	5.4	0.20	25.6	18.0	7.6	26.3	19.4
1980	5.2	0.57	27.8	18.9	8.8	28.3	19.4
1981	5.9	0.82	28.0	19.0	8.9	27.9	19.5
1982	5.4	0.51	26.9	19.1	7.9	23.2	18.9
1983	5.6	0.89	28.5	20.5	8.0	25.6	15.8
1984	5.8	0.97	28.6	20.3	8.3	24.7	17.7
1985	4.6	0.44	27.2	18.5	8.7	24.8	19.1
1986	5.5	0.63	25.8	18.4	7.4	22.0	21.1
1987	9.5	0.70	27.6	21.7	6.0	25.7	23.2
1988	13.3	1.79	30.7	25.6	5.0	32.9	25.9
1989	12.2	2.46	34.6	29.6	5.0	35.7	27.8
1990	11.2	2.96	40.4	34.2	6.1	38.7	27.0
1991	8.6	2.05	41.6	34.4	7.2	38.1	28.9
1992	8.1	1.90	39.3	31.1	8.1	36.4	29.1
1993	8.4	1.32	39.5	31.6	7.9	36.7	29.4
1994	8.9	0.60	40.0	31.3	8.7	37.7	31.3
1995	8.8	0.70	41.1	32.2	8.9	42.0	33.5
1996	5.5	0.76	41.1	30.8	10.2	39.3	30.3
1997	-0.4	2.19	35.6	24.1	11.5	39.9	37.4

Table C- 1 Data Used in the Estimated of Econometric Model for Thailand, 1965-1997, (continued)

Year	DCY	REX	YWG	TTM	TTX	Notes
1965	17.4	103.9	3.9	95.2	121.2	*YG*: GDP Growth Rate
1966	16.9	105.0	5.8	89.5	120.0	*FDIY*: Ratio of Foreign Direct Investment to GDP
1967	18.7	106.5	5.3	85.4	114.1	
1968	21.5	104.0	7.1	79.7	111.8	
1969	24.1	101.1	6.5	76.1	112.9	*IY*: Ratio of Domestic Investment to GDP
1970	25.2	95.4	5.9	82.4	107.1	
1971	29.6	92.0	3.6	86.2	101.9	*DPIY*: Ratio of Domestic Private Investment to GDP
1972	31.7	93.3	5.7	86.9	102.0	
1973	31.0	102.4	6.3	87.7	138.5	*DGIY*: Ratio of Domestic Public Investment to GDP
1974	28.7	116.0	0.4	114.2	164.8	
1975	33.1	111.9	0.6	90.7	104.9	*MY*: Ratio of Imports to GDP
1976	36.2	110.1	4.6	91.8	97.9	
1977	39.9	111.3	3.3	91.7	93.0	*XY*: Ratio of Exports to GDP
1978	42.9	111.9	3.5	91.7	93.1	
1979	44.4	110.1	4.0	96.4	101.3	*DCY*: Ratio of Domestic Credit to GDP
1980	42.6	115.8	1.9	100.0	100.0	
1981	43.6	111.0	1.0	104.8	91.4	*REX*: Real Effective Exchange Rate
1982	51.1	104.4	-0.8	102.1	80.7	
1983	59.1	104.9	2.1	92.9	78.9	*YWG*: Real World Income Growth Rate
1984	65.1	98.7	3.4	93.5	77.5	
1985	69.0	85.0	1.6	99.3	77.7	*TTM*: Relative price for Imports
1986	67.3	87.7	2.3	90.6	78.5	
1987	67.0	88.6	3.8	80.7	79.1	*TTX*: Relative price for Exports
1988	64.6	89.9	4.6	85.7	82.6	
1989	65.0	89.0	3.7	87.1	80.7	
1990	70.1	89.8	3.2	86.4	77.7	All variables unit are Million bahts of 1980 prices, unless otherwise noted.
1991	70.5	91.4	2.1	85.3	76.0	
1992	73.6	92.7	2.1	82.4	73.8	
1993	80.5	93.4	1.9	79.9	72.1	
1994	90.8	96.3	3.2	77.8	70.9	
1995	96.7	100.0	3.0	82.2	72.5	
1996	99.3	101.1	3.4	87.8	75.9	
1997	127.0	84.3	2.9	98.6	85.6	

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