Foreign Trade Regime and FDI-Growth Nexus :

A Case Study of Thailand

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Abstract : *This paper examines the role of trade policy regimes in conditioning the impact of foreign direct investment (FDI) on growth performance in investment receiving (host) countries through a case study of Thailand. The methodology involves estimating a growth equation, which provides for capturing the impact of FDI interactively with economic openness on economic growth, using data for the period 1970-1999. The results support the 'Bhagwati' hypothesis that, other things being equal, the growth impact of FDI tends to be greater under an export promotion (EP) trade regime compared to an import-substitution (IS) regime.*

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1. Introduction

The role of foreign direct investment (FDI) has been widely recognized as a growth-enhancing factor in developing countries. FDI enables investment receiving (host) countries to achieve investment levels beyond their own domestic saving. More importantly, FDI is an important means of transferring modern technology and innovation from developed to developing countries. However, there is convincing evidence that the growth enhancing effect from FDI seems to vary from country to country and for some countries FDI can even adversely affect the growth process (Balasubramanyam *et al.,* 1996; Borensztein *et al.,*1998; De Mello, 1999; Lipsey, 2000 and; Xu, 2000). In other words, contrary to the popular belief, the growth-enhancing effect of FDI is not automatic but depends on various country specific factors.

One such important factor is the nature of the trade policy regime in host countries. Starting with the pioneering paper by Bhagwati (1973), a sizable theoretical literature has explored to explain how the restrictiveness (openness) of the trade regime conditions the gains from FDI to host countries (Bhagwati, 1978, 1985 and 1994; Brecher and Diaz-Alejandro 1977; Brecher and Findlay 1983). A key hypothesis arising from this literature (which is now know as the 'Bhagwati hypothesis') is that gains from FDI are likely to be far less or even negative under an import substitution (IS) regime compared to a policy regime geared to export promotion (EP) regime. Despite its immense policy relevance, so far only a few studies have been undertaken to

test this hypothesis empirically (e.g. Balasubramanyam *et al.*, 1996 and Athurokola and Chand, 2000). Moreover, these studies have been conducted using inter-country cross sectional data. Cross-sectional regression analysis is based on the implicit assumption of 'homogeneity' in the observed relationship across countries. This is a very restrictive assumption because there are considerable differences across countries in relation to various structural features and institutional aspects, which have a direct bearing on the FDI-growth relationship. There are also vast differences among countries with respect to the nature and quality of data, which make cross-country comparison a rather risky business. More importantly, the cross-sectional approach cannot capture the dynamic effects of a shift from an IS regime towards an EP regime. There is therefore a need for systematic time-series analyses of individual country experiences in order to broaden our understanding of this important issue.

The purpose of this paper is to examine the effect of trade policy regime on FDI contribution to economic growth using time series data from the Thai economy. Thailand is a good laboratory from testing the hypothesis for two reasons. First, throughout the past four decades, Thailand has been a significant recipient of FDI among developing countries. Second, and more importantly, Thailand has undergone a clear policy transition from an IS regime to an EP regime over this period. The trade policy regime in Thailand was characterized by a heavy emphasis on import-substitution in the 1960s and 1970s. From the late 1970s there has been a palpable shift towards greater export orientation.

The remainder of this paper is structured as follows. Section 2 provides an overview of policy shifts and the role of FDI in the Thai economy. The theoretical framework of the study is developed in Section 3. Section 4 presents the model, followed by a discussion of the data and the econometric method in Section 5. The results are presented and discussed in Section 6. The concluding section presents key inferences and policy implications.

2. An Overview of FDI and Trade Policy in Thailand

Inflows of FDI to Thailand increased from around US$ 400 million during the period of 1970-74 to over US$ 6,560 million during the period of 1995-99. The share of FDI in Gross Domestic Investment (GDI), which was around 2-3 per cent in the 1980s, reached to 20 per cent in 1998 (Table 1). Moreover, the share of total FDI mainly comes into the manufacturing sector over the years. During the early 1970s, manufacturing sector accounted for 30 per cent of total inflows. This increased to about 44 per cent in the period of 1985-1989. There was a mild decline in the share to around 38 per cent in the latter half of the 1990s. This was mostly due to reduced profitability in domestic market oriented investment following the on-set of the currency crisis in late 1997.

Up to about the late 1970s, FDI was predominant in import-substitution industries such as textiles, automobiles, and chemicals. From then on, an increasing share of FDI was directed to more export-oriented activities. To begin with, export-oriented FDI comes to light manufacturing industries such as clothing, textiles, footwear and toys. More recently, labor-intensive assembly activities in electronics and electrical goods industries have been the main attraction to foreign investors.

The shift in the composition of FDI from domestic-market oriented production to export-oriented production has closely mirrored the shift in the domestic trade policy regime. Thailand launched the first national economic development plan in 1961 with the import substitution (IS) regime to promote industrialization. Tariff was the major instrument used to influence the country development path. The role of tariff to promote domestic industry effectively began in 1974 by imposing escalation tariff structure where tariff rate ascended from raw materials to

finished products. These changes increasingly favored the production of finished products, particularly consumer products. The range of effective rate of protection (ERP) [1] in the Thai manufacturing sector was between –20.92 to 236.43 per cent in 1971 (Akrasanee, 1975). This had increased to -21.44 to 1693.41per cent in 1982 (Mongkolsamai *et al.*, 1985). This highly distortionary tariff structure remained virtually unchanged until the late 1980s even though the government announced changing the development strategy to export-promoting (EP) regime in 1974.

Significant reduction of tariff began in 1988 starting with those on electrical and electronic goods as well as inputs into these products. Comprehensive packages of tariff reform were implemented in 1995 and 1997. These packages aimed to reduce both the nominal tariff rates and different rates across products. By the end of the 1990s, the maximum rate had come down to 30 per cent from 100 per cent in the early 1990s. Moreover, there are six tariff rates. Raw material imports are either duty free or face one percent duty. The two tops (20 per cent and 30 per cent) relate to finished products, and the two middle rates (5 per cent and 10 per cent) are for intermediate goods. As the result, the average tariffs have declined markedly from 30 per cent in 1990 to 21 per cent in 1995 and then 17 per cent in 1997. The decline in tariff levels was accompanied by a significant reduction in the variation of ERP across industries (Vorsas-ngasil, 1999).

[1] The effective rate of protection (ERP) is the proportional difference in industries' value added between two situations; free trade and domestic situation. The higher the ERP in an industry, the domestic policy favors to that particular industry. This also implies the higher return on investing in the industry. Moreover, the variation between industries implies the non-neutrality in tariff structure.

3. Analytical Framework

The theory of the effect of trade policy regime on gain from FDI in a given host country was first presented by Bhagwati (1978) as an extension to his theory of immiserizing growth and further developed by Bhagwati (1985 and 1994); Brecher and Diaz-Alejandro (1977); Brecher and Findlay (1983). It postulates that FDI inflows coming into a country in the context of a restrictive, IS regime can retard, rather than promote growth. This is because in an IS regime, FDI (as well as domestic investment) mostly take place in sectors (mostly characterized by high capital intensity in production) where the host developing country does not have comparative advantage. Moreover, FDI becomes an avenue for foreign companies to maintain their market share and to reap the extra profit, the economic rent, created by the highly protected domestic market. Such a regime also provides incentives for rent seeking and directly unproductive profit seeking (DUPE) activities

On the other hand, the EP regime, which aims to achieve neutrality in incentives, is superior to the IS regime in reaping gains from FDI. Under the EP regime the main incentives for FDI in a given host country are the relatively low labor cost and/or the availability of raw materials. This allows the foreign investors to operate in an environment that is relatively free from distortions. This also leads to the output expansion in internationally competitive and export oriented product lines. Moreover, the production of firms in an EP regime is not limited by the size of the domestic market and has the potential to reap economies of scale through international market penetration.

FDI is an important channel of R&D spillover (including human capital development) from developed to developing countries (Grossman and Helpman, 1991[2]). Given that the multinational enterprises (MNEs), the major direct investors[3], conduct a large proportion of the world's total R&D (Borensztein *et al.*, 1995; Lipsey, 2000; and Sjoholm, 1997). There are several ways that investment of MNE subsidiaries likely generates technology spillovers to host countries such as training local staff, enhancing production standard for backward and forward related industries, and enhancing the competitive pressure to local entrepreneurs. Moreover, localization of foreign subsidiaries generates the demonstration effect on domestic firms on technological choices, managerial practice, etc.

The generation of favorable technology spillovers requires a conducive investment climate. The IS regime is unlikely to provide an economic climate conducive to the favorable spillover from foreign firms. The FDI generated by IS regime is invested mostly in the industries where proprietary assets are important[4]. This creates barriers to entry for local firms and thus constraints technology and efficiency spillovers. Moreover, the protection generated from IS regime likely limits the local competition, which is the important factor that stimulates firms to update new technologies in both production and management, and enhances their own productivity. In contrast, the EP regime is more conducive to generating favorable spillover effects because under such regime FDI is mostly attracted to industries in which the country has comparative advantage. In such industries local firms have a greater potential to catch up with

[2] Spillover is defined as the external effects of R&D that a firm invents for enhancing its own productivity to the other firms. Spillovers can occur both with the country and across the country (Sjoholm, 1997).

[3] Over four-fifths of the stock of foreign direct investment originates from only half of a dozen countries- the U.S.A., United Kingdom, Japan, Germany, Switzerland, and the Netherlands- which are also the major producers the most advanced technology (Blomström *et al.*, 2000)

[4] Proprietary assets are defined as the asset that can differ productivity between firms owning them and the others. They can generate revenue productivity. Other firms cannot quickly or effectively imitate (Caves, 1996).

foreign firms and achieve productivity improvement. This generates healthy competition and allows host countries to maximize the gain from technology spillover from foreign firms.

4. The Model

Based on the above discussion, the model to investigate the interaction of FDI and trade policy regime in economic growth is derived by using the production function framework. The starting point of model formulation is the aggregate production function.

$$Y = f(A, L, K) \qquad \text{---------} \quad (1)$$

where Y is output (gross domestic product (GDP)), L is employment and K is capital stock. The variable A captures the total factor productivity (TFP) of growth in output not accounting for increasing in factor inputs (K and L). According to the new (endogenous) growth theory, A is endogenously determined by economic factors. Since the available data on FDI do not fully capture addition to domestic investment by foreign firms (Lipsey, 2001), it is not possible to separate local and foreign components of domestic investment. However, by making the reasonable assumption that the method of estimating FDI has been consistent over the years, the effect of FDI on economic growth operating through A. Remarkably, the effect of FDI on A also depends on the trade policy regime. Thus, a proxy variable for the openness of trade policy regime (TP) needs to be incorporated in the equation.

$$A = G(FDI, FDI*TP) \qquad \text{----------} \quad (2)$$

Substituting (2) in (1)

$$Y = F\ (\ L, K, FDI, FDI*TP) \qquad \text{----------} \ (3)$$

Since a reliable data series on capital stock is not available for Thailand, in this study, the ratio of gross domestic capital formation (GDI) to GDP is employed to represent *K*. This proxy variable has been used in numerous previous studies (e.g. Barro, 1999; Balasubramanyam *et al.*, 1996). The variable *FDI* is measured as the ratio of FDI inflow to GDP.

There is no unique measure of openness of the trade policy regime.[5] In this study we use three alternative proxies; (a) the ratio of total merchandise trade (import + export) to goods GDP (that it, total GDP net of value added in construction and services sectors),(*OPEN1).*, (b) is the ratio of export to gross output in manufacturing sector (*OPEN2), and (c)* the ratio of world price (converted to domestic currency) to domestic price indexes of manufactured products (*OPEN3*). . The first measure is superior to the widely-used trade to GDP ratio because the inclusion of non-traded activities (construction and services) as part of the denominator leads to an under-estimation of the exposure to foreign trade of the given economy (Rivera-Batiz and Rivera-Batiz, 1994). This point is particular relevant in Thailand where the construction and financial services recorded rapidly growth during latter part (from the later 1980s) of the period under study. The second measure is based on the premise that greater openness is a prerequisite for successful world market penetration in manufactured goods. In other words, export success in manufacturing likely occurs under a policy regime where policies are more neutral and allows the market mechanism effectively indicate the country's comparative advantage (Edwards, 1993). The rationale behind the third openness measure is that under free trade, the domestic price of manufactured goods should move in line with the world price converted into domestic currency. Impositions of trade restrictions raises domestic price above world price and hence the ratio of world price (*Pw*) to domestic price (*Pd*) tends to decline. By contrast, trade liberalization tended

[5] For a succinct discussion on various measures of openness and detailed listing of related references, see Edwards (1998).

to reduce the gap between the two prices. Thus, a country that undergoes a policy shift from IS to EP regimes tends to experience an increase in the relative price index (*OPEN3*) (Athukorala and Rajapatirana, 2000; and Krueger, 1978)

The estimating equation used in the empirical analysis, is

$$Y_t = \alpha + \beta_1 L_t + \beta_2 K_t + \beta_3 FDI_t + \beta_4 (TP_t * FDI_t) + \varepsilon_t \quad \text{---------- (4)}$$

where Y = gross domestic product, GDP (in log form)

L = (+) number of labor force (in log form)

K = (+) the percentage of gross domestic capital formation to GDP

FDI = (+/-) the percentage of foreign direct investment to GDP

TP = (+) Openness of the trade policy regime proxied alternatively by

(1) OPEN1 = the ratio of total merchandise trade to goods GDP

(2) OPEN2 = the export-output ratio the ratio of total merchandise trade

(3) OPEN3 = the relative price index

t = time subscript.

ε = stochastic error term

The sign expected for the regression coefficient is given in bracket.

The coefficients β_1 and β_2 are the output elasticity with respect to labor and capital. The impact of FDI on growth (Y) is given by the partial derivative of Y in (4) with respect to FDI, $\beta_3 + \beta_4 * TP$. To test the relevance of Bhagwati hypothesis, the statistical significance of β_4 is examined. Under the Bhagwati hypothesis, the sign of β_4 is expected to be positive. That is, the

contribution of FDI to growth will be an increasing function of *TP*. The sign of β_3 is ambiguous; it can be positive or negative depending on the nature of the trade policy bias over the entire sample period whereas β_4 aims to capture the impact of trade policy regime operating thorough FDI. Even when β_3 is negative, it does not imply that the FDI contribution is negative. Whether its contribution is negative or not depends on the size of the coefficient of the interactive term of FDI and trade policy regime, β_4 compared to the β_3.

5. Data and the Method of Estimation

The model is estimated using annual data for the period 1970- 1999. Data on gross domestic product (GDP), manufacturing output, gross domestic capital formation (GDI) are obtained from the *National Income Account*, National Economic and Social Development Board (NESDB) in Thailand. FDI inflows, wholesale price index of manufactured products, and exchange rate are from the *Bank of Thailand quarterly bulletin*, Bank of Thailand. The data on the work force comes from the *Key Indicators of Developing Asian and Pacific Countries*, Asian Development Bank (ADB). The *OPEN2* variable, the ratio of total merchandise trade to goods GDP is obtained from *World Development Indicators*, World Bank. In constructing the data series on *OPEN3*, the world price is measured in terms of the US producer price index, obtained from the *International Financial Statistics*, International Monetary Fund, (IMF). The domestic manufacturing price is measured using the wholesale price index of manufactured goods mentioned above.

The first step of the estimation process was to examine the time series properties of the data series. The Dickey-Fuller (DF) test is employed for this purpose. The results, reported in Table 2, suggest that all data series are integrated processes of order 1 or *I* (1) (i.e. the series are

non-stationary in level but stationary in first-differences). The implication is that the set of variables taken together has the potential to form a co-integrating vector whose coefficient can directly be interpreted as long-term (steady-state) elasticities. Therefore, the model is estimated using the co-integration technique.

We used the Engle-Granger method and the fully modified OLS estimator proposed by Phillips-Hansen (1990) as alternative techniques of estimation. The reasons for choosing these among various other co-integration techniques are discussed in the appendix 1. Note that since the main interest here is in the long-run relationship postulated by the Bhagwati's hypothesis, estimating short-run dynamics is not intended.

6. Results

The regression results are reported in Table 3. Note that we have estimated the model for the entire sample period (1970-1999) as well as for the pre-crisis period (1970-1996). This was done in order to see the sensitivity of the results to economic disturbances created by the crisis. The results are similar, apart form minor differences relating to the size of some coefficients. The discussion in this section focuses on the estimate for the entire period. The three alternative measures of *TP* yielded basically comparable results. The following discussion focuses on the results based on the export-output ratio in manufacturing (*OPEN2*). This choice was made on the basis of superior stationary property of the regression residual. The alternative estimates are reported in Appendix 2.

Results based on the two alternative estimation methods (the Engle-Granger and Phillip-Hanson procedures) are reported with the corresponding unit root tests for the residuals (table 3). In terms of the DF test, the residuals are stationary in both cases and therefore the estimated

equations can be interpreted as long-run relationships. The coefficient estimates from both methods are strikingly similar. In the following discussion we focus only on the equation estimated using the methodologically more robust PH procedure.

The estimate of β_4 (the coefficient attached to *TP*FDI*) is significantly different from zero with the theoretically expected (positive) sign, providing strong support for the Bhagwati hypothesis. That is the growth impact of FDI on the Thai economy seems to have significantly enhanced as the country's trade policy regime shifted from IS emphasis and toward greater export orientation. Moreover, the significant and negative sign of β_3 implies the FDI inflows could have even generated a negative effect on growth performance of the economy under the IS regime. Evaluating at the average value of *OPEN2* over the past three decades, the contribution of FDI impacted negatively on growth performance of the Thai economy. The negative effect amounted to about 4% of the average annual growth during this period.

The results are consistent with the general inference of previous studies that the contribution of FDI to the overall performance of the Thai economy was not significant during the 1970s and early 1980s (e.g. Tambunlerchai, 1975; and Pongpisanupichit, 1985).[6] Under the IS regime, high domestic trade protection attracted foreign investors mostly to share economic rents with local firms. FDI was concentrated in capital- and technology-intensive industries where technology gap between foreign and local owned firms was very high. Thus the capacity of local firms to learn from foreign firms was limited.

Since the late 1980s to the early 1990s, FDI inflows gradually shift to light manufacturing industries particularly labor intensive assembly activities in electronic and

[6] Tambunlerchai (1975) and Pongpisanupichit (1985) examined the FDI contribution in Thai manufacturing sector during the early 1970s and the period of late 1970s to the early 1980s, respectively.

electrical goods where the country has comparative advantage in international production. The new FDI firms are more export-oriented relatively to those in the early 1970s. With relatively smaller technology gap, the presence of such foreign affiliates likely demonstrate managerial as well as international marketing and consequently enhance export-propensity to local firms.

7. Conclusion

This paper has examined the effect of trade policy regime on FDI contribution to economic growth using time series data from the Thai economy. The empirical analysis was built around the 'Bhagwati' hypothesis that an export-promoting regime is more conducive compared to an import-substituting regime in generating favorable effect of FDI for the host countries. The findings are consistent with this hypothesis. Thus the Thai experience during the period under study makes a strong case for simultaneous liberalization of trade *and* investment policy regimes. Liberalizing the foreign investment regime while retaining a restrictive trade policy regime could well generate immiserizing growth.

Table 1

Foreign Direct Investment Net Inflows in Thailand during the period of 1970-1999

Period	Value ($Million)	% of Gross Domestic Investment	% Manufacturing FDI of Total FDI
1970-1974	416	3.5	30
1975-1979	382	1.7	39
1980-1984	1,487	2.6	31
1985-1989	3,687	3.8	44
1990-1994	3,174	4.5	30
1995-1999	6,565	9.5	37
1995	567	2.9	28
1996	708	3.0	31
1997	1859	7.5	50
1998	2,165	20.4	43
1999	1,267	13.6	36

Source : Bank of Thailand, *Quarterly Bulletin* (Various Issues)

Table 2

Integrating Test for Data Series Employed

Variables	T-statistics for I(0)	T-statistics for I(1)
Gross domestic product **(*Y*)**	-2.89	-3.42
Ratio of foreign direct investment to GDP **(*FDI*)**	-2.2	-3.84
Labor Force **(*L*)**	-1.14	-4.33
Ratio of gross domestic capital formation to GDP **(*K*)**	-1.32	-2.98
Merchandise trade to goods GDP ***(OPEN1)***	-1.48	-4.66
Export-output ratio **(*OPEN2*)**	-1.46	-4.62
Relative Price Index (***OPEN3***)	-2.62	-4.30

Note : 1. The t-statistic reported is the t-ratio on γ_1 in the following auxiliary regression.

$$\Delta X_t = \gamma_0 + \gamma_1 X_{t-1} + \sum_{i=1}^{p} \beta_i \Delta X_{t-i} + \gamma_3 T + \mu_t$$

where X is the considering variable; T is a time trend and μ is the disturbance term. In estimating the regression the lag length (p) on the lagged dependent variable and T are determined by the Atiken Information Criterion (AIC) to ensure the white property of corresponding residual from the regression.

2. The null hypothesis of non-stationary I(1) is accepted for all variables at the 5 % significant level.

Table 3

Long-Run Determinants of Economic Growth during the 1970-1996 and 1970-1999

Variables	Whole Period (1970-1999)		Pre-Crisis Period (1970-1996)	
	EG	PH	EG	PH
Intercept	8.60 (28.38)	8.90 (39.34)	9.10 (46.90)	9.10 (68.97)
L	1.43 (11.41)	1.29 (14.05)	1.36 (17.07)	1.39 (25.72
K	0.03 (6.75)	0.03 (11.33)	0.02 (3.45)	0.01 (4.10)
FDI	-0.15 (-3.99)	-0.15 (-6.26)	-0.18 (-7.75)	-0.18 (-12.99)
*OPEN1*FDI*	0.62 (7.58)	0.67 (12.00)	1.45 (7.20)	1.61 (13.06)
DF	-4.19	-4.54	-4.92	-5.41

Note : 1. EG = Engle-Granger estimation and PH = Phillip Hansen estimation

2. Number in parenthesis is the corresponding t-statistics

3. DF is the corresponding t-statistics of lagged residuals from testing DF unit roots on residuals. 95% and 90% critical value for rejected the hypothesis that residual is characterized as I(0) is –4.48 and –4.09 respectively. This critical value is from the response surface table developed by Mackinon (1991)

Appendix 1
Econometric Procedure

Although the OLS estimator from the co-integrating regression possesses the large sample property of consistency and are highly efficient, they are still biased in small samples. In the case of small samples, the OLS estimator has an asymptotic distribution, which is non-normal and is affected by nuisance parameters. This makes statistical inference difficult since the standard t-statistics will not be valid asymptotically. Therefore, in this study, the fully modified OLS estimator proposed by Phillips and Hansen (1990) is employed. The fully modified OLS estimator or Phillips-Hansen (PH) procedure is an optimal single-equation technique, which is asymptotically equivalent to maximum likelihood. It applies a semi-parametric correction to the standard OLS procedure. This corrects both the impact on residual term of autocorrelation as well as endogeneity. This provides median-unbiased estimators and provides t-statistics, which follow normal distribution asymptotically.

In theory, the maximum likelihood method (a full parametric correction) proposed by Johansen (1988) is superior to the PH procedure because under the Johansen method, the unit roots are explicitly incorporated in the specification. It also takes into account short-run dynamics in estimating the co-integrating vector, and additionally provides for testing for the existence of more than one co-integrating vector. Meanwhile, the PH procedure yields little improvement on the precision as well as the biasness of the estimator, particularly in the case that the lagged dependent variable included. Moreover, in the large sample, the t-statistics poorly perform (Inder, 1993).

However, the small-sample properties of the Johansen method are still unknown. Moreover, recent applications of this technique have encountered some practical difficulties

(Hall, 1991). The first problem is that criteria to determine the number of co-integration relations such as trace, determinant, and eigen value are very sensitive to the choice of lag length for the VAR (Vector Autoregressive). In this study, for instance, the Johansen Co-integration estimations yields results that are far from economically interpretation such as the negative elasticity of labor, enormous values of coefficient estimated. Moreover, the results are highly sensitive to VAR orders selected. Moreover, severe collinearity may emerge between some of the regressors, particularly when dealing with VARs of a reasonable size. This in turn renders the point estimates of the long-run elasticities even more sensitive to the choice of lag specification. In addition, there are not economic reasons to suggest for more than one co-integration vector for the variables under study. With these reasons, the PH procedure is preferred in this study.

Appendix 2

Estimation Results Based on Alternative Openness Indicators 1970-1999

	Openness 1		Openness 2		Openness 3	
Variables	EG	PH	EG	PH	EG	PH
Intercept	8.83	9.00	8.60	8.90	8.15	8.62
	(22.54)	(26.62)	(28.38)	(39.34)	(14.12)	(17.48)
L	1.42	1.34	1.43	1.29	1.64	1.43
	(9.25)	(10.24)	(11.41)	(14.05)	(6.79)	(7.05)
K	0.02	0.03	0.03	0.03	0.02	0.03
	(4.99)	(6.91)	(6.75)	(11.33)	(2.36)	(4.07)
FDI	-0.55	-0.55	-0.15	-0.15	-0.36	-0.44
	(-4.91)	(-6.36)	(-3.99)	(-6.26)	(-1.52)	(-2.43)
*OPEN*FDI*	0.40	0.41	0.62	0.67	0.31	0.36
	(5.79)	(7.48)	(7.58)	(12.00)	(1.90)	(2.91)
DF	-2.60	-2.69	-4.19	-4.54	-1.66	-1.32

Note : 1. EG = Engle-Granger estimation and PH = Phillip Hansen estimation
2. Number in parenthesis is the corresponding t-statistics
3. *OPEN1* = the total merchandise trade to goods GDP.
OPEN2 = the export-output ratio
OPEN3 = the relative world to domestic price of tradable goods.
4. DF is the corresponding t-statistics of lagged residuals from testing DF unit roots on residuals. 95% and 90% critical value for rejected the hypothesis that residual is characterized as I(0) is –4.48 and –4.09 respectively. This critical value is from the response surface table developed by Mackinon (1991)

References

ADB (Asian Development Bank), various issues. *Key Indicators of Developing Asian and Pacific Countries.*

Akrasanee, N., 1975. *The Structure of Effective Protection in Thailand: A Study of* Industrial and Trade Policies in the Early 1970's. Bangkok.

Athukorala, P. and S. Chand., 2000. 'Trade orientation and productivity gains from international production : a study of overseas operation of United States TNCs' *Transnational Corporations*, 9(2):1-27.

Athukorala, P. and S. Rajapatirana., 2000. *Liberalization and Industrial Transformation: Sri Lanka in International Perspective*, Oxford University Press, Oxford.

Balasubramanyam, V.N., M.A. Salisu, and D. Sapsford., 1996. 'Foreign direct investment and growth in EP and IS countries' *Economic Journal*, 106 (434) : 92-105.

Bank of Thailand, various issues. *Bank of Thailand Quarterly Bulletin.*

Barro, R.J., 1999. *Determinants of Economic Growth : a Cross-Country Empirical Study*, MIT press, Cambridge.

Bhagwati, J.N., 1973. 'The theory of immiserizing growth; further applications' in M. Connolly and A. Swoboda (eds.), *International Trade and Money*, University of Toronto Press, Toronto: 45-54

---------, 1978. *Anatomy and Consequences of Exchange Control Regimes*, Balinger Publishing, New York.

---------, 1985. *Inveting Abroad*: *Esmée Fairbairn Lecture*, Lancaster University Press, Lancaster.

---------, 1994. 'Free trade: old and new challenges', *Economic Journal*, 104 (423), pp.231-246.

Blomström, M., A. Kokko, and M. Zejan., 2000. *Foreign Direct Investment : Firm and Host Country Strategies*, St. Martin, New York.

Borensztein, E., J.D. Gregorio, and J.W. Lee, 1998. 'How does foreign direct investment affect economic growth?', *Journal of International Economics*, 45:115-35.

Brecher, R.A. and Carlos F. Daiz Alejandro., 1977. 'Tariffs, foreign capital and immiserizing growth', *Journal of International Economics*,7(3): 317-322.

Brecher, R.A. and R. Findlay., 1983. 'Tariff, foreign capital and national welfare with sector-specific factors' *Journal of International Economics*, 14:277-288.

Caves, R.E.,1996. *Multinational Enterprise and Economic Analysis*, Cambridge University Press, Cambridge.

De Mello, L R., Jr., 1999. 'Foreign direct investment-led growth evidence from time series and panel data', *Oxford Economic Papers* 51: 133-151.

Edwards, S., 1993 'Trade and growth in developing countries', *Journal of Economic Literature* 31(3): 1358-1393.

Edwards, S., 1998. 'Openness, productivity, and growth: what do we really know?', *Economic Journal* 108: 383-98.

Grossman, G. and E. Helpman., 1991. *Innovation and Growth in the Global Economy*, MIT Press, Cambridge.

Hall, S.G., 1991. ' The effect of varying length VAR models on the maximum likelihood Estimates of Co-integrating Vectors', *Scottish Journal of Political Economy*, 38(4): 317-23.

IMF (International Monetary Fund), various issues, *International Financial Statistics.*

Inder, B., 1993. ' Estimating long-run relationship in economics: a comparison of different approaches', *Journal of Econometrics*, 57: 53-68.

Johansen, S.,1988. 'Statistical analysis of co integrating vectors', *Journal of Economics Dynamics and Control*, 12(2): 231-54.

Kruger, A.O., 1978 *'Foreign Trade Regimes and Economic Development : Liberalization Attempts and Consequences'* Ballinger Publish Co. for NBER, Cambridge,

Lipsey, R.E., 2000.'Inward FDI and economic growth in developing countries' *Transnational Corporations,9(1): 67-95.*

Lipsey, R.E.,2001. *Foreign direct investment and the operations of multinational firms : concepts, history and data*, NBER Working Paper 8665, Cambridge, MA: National Bureau of Economics Research (NBER).

Mackinnon, J.G., 1991. 'Critical values for Cointegration Tests' in R.F. Engle and C.W.J. Granger (eds.), *Long-Run Economic Relationships: Readings in Cointegration*, Oxford University Press, Oxford: chapter 13.

Mongkolsamai,D., S. Chunanuntahum, and S. Tambunlerchai.,1985. 'Fiscal policy for investment incentive : effectiveness and effect to government revenue' Thammasat Journal of Economics, 3: 39-80. (in Thai)

National Economic and Social Development Board, various issues, *National Income Account.*

Ponpisanupichit, J.,1985. 'Private Direct Investment and Thai Economy', Ph.D. dissertation, Cornell University.

Phillips,P C.B.. and B.E. Hansen., 1990. ' Statistical inference in instrumental variables

regression with I(1) processes', *Review of Economic Studies*, 57: 99-125.

Rivera-Batiz, F. and L.A. Rivera-Batiz., 1994. *International Finance and Open Economy Macroeconomics (second edition)*, Macmillan publishing, New York.

Sjoholm, F., 1997. *R&D, International Spillovers and Productivity Growth*, Lund Economics Studies No.63, Lund University, Lund.

Tambunlertchai, S.,1975. 'Foreign Direct Investment in Thailand's Manufacturing Industries' Ph.D. Dissertation, Duke University.

Vorasa-ngasil, Nuthikarn., 1999. 'Tariff Restructuring and Protection in Thai Manufacturing Sector', Master of Economics, Faculty of Economics, Thammasat University. (in Thai)

World Bank, various issues, *World Development Indicators*.

Xu, B., 2000. 'Multinational enterprises, technology diffusion, and host country productivity growth', *Journal of Development Economics*, 62: 477-93.