

## **Chapter 5**

### **Empirical Results and Interpretation**

The first and second sections in this chapter deal with the empirical results of the first and second revised models (total FDI in Thailand and FDI from EU in Thailand) from chapter four. Next, the conclusion of those empirical studies will be presented with some policy implications, which can help recommend some relevant policies in order to induce more FDI. Finally, existing policies of the Thai Government to stimulate FDI are discussed.

In deriving the foreign direct investment function in this study, it is hypothesized that FDI inflow is explained by both internal and external factors. The internal factors mentioned in the models are the real gross domestic product GDP, the average tariff rate TARIFF, electricity generation of Thailand EGKC, political stability DPOL, the central bank's discount rate DISCOUNT and relative Thai wage WAGE1 and WAGE2. The external factors expected to influence FDI inflow into Thailand are Thai exports TEXPT and EXPT, home countries' government bond yield BOND1, BOND2, the exchange rate of the Thai currency EXRT, the average growth rate in EU and OECD countries GREU and GROECD, and a dummy variable represents the period before and after the EC 1992 programme. Moreover, FDI in the previous periods FDI(-1) and FDI(-2) is also taken into account since these direct investments are long run investment that always require new inflow of capital to expand projects.

Time-series data between 1970 and 1997 for Thailand (see Appendix A) are used within the one-equation models and are estimated by ordinary least-squares (OLS) regression. The use of OLS, enables the estimation of over-identified equations, purges the endogenous explanatory variables and minimizes the problem of multicollinearity, while the standard errors are corrected for heteroscedasticity. OLS is used to estimate the

coefficients of various independent variables. Such coefficients can show size and direction effects on the dependent variables (TFDI and FDI).

An assessment of the tests of significance reveals that the D-W (Durbin-Watson) statistics are not sufficient to check autocorrelation, because the models in this study are autoregressive models and D-W cannot detect autocorrelation. Thus, in these models Durbin-h statistic is used to detect the autocorrelation problem, instead of D-W. The coefficients of determination adjusted for degrees of freedom ( $R^2$ ) denote the explanatory power of the equations in the model.

The regression results presented in Table 5.1 and 5.2 contain the estimated equations and the customary tests of significance. Overall, the linear formulation of the model is appropriate, as a large number of coefficients of determination, adjusted for degrees of freedom, are quite high and all estimated equations perform significantly since their estimated F-statistics are well above tabulated F-values.

The reason for using the time-lag analysis is that in order to invest in Thailand, an enterprise seeking has to formally contact the Board of Investment (BOI). In order to obtain permission with investment privileges to invest in Thailand, the enterprise has to wait for approximately nine months in such a process; from applying to receiving the permission. Therefore, if we assume that the present time is  $t$ , the investment decision in  $t$  will only have an effect on the FDI value, in this case, not before the  $(t+1)$  period.

### 5.1 Empirical Results of Total Foreign Direct Investment in Thailand

**Table 5.1: Empirical Results of Total Foreign Direct Investment in Thailand.**

LS // Dependent Variable is TFDI				
Date: 09/01/98 Time: 18:12				
Sample (adjusted): 1971 1997				
Included observations: 27 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	58953.98	61432.96	0.959647	0.3524
GDP	73.19235	30.70456	2.383762	0.0308
TARIFF	-7496.083	1993.021	-3.761165	0.0019
EGKC (-2)	-7.984076	3.021337	-2.642564	0.0185
TEXPT (-1)	3.979550	1.840104	2.162676	0.0471
WAGE2 (-1)	-1951460.9	985214.3	-1.980748	0.0663
BOND2 (-2)	593.2297	2699.642	0.219744	0.8290
EXRT	7089.330	3419.653	2.073114	0.0558
GROECD	3040.624	1996.751	1.522786	0.1486
DEU	-39582.19	22356.66	-1.770487	0.0970
DPOL (-3)	3806.522	8194.947	0.464496	0.6490
TFDI (-1)	0.394530	0.177052	2.228326	0.0416
R-squared	0.942046	Mean dependent var.		34756.13
Adjusted R-squared	0.899546	S.D. dependent var.		40833.79
S.E. of regression	12942.08	Akaike info criterion		19.23758
Sum squared resid	2.51E+09	Schwarz criterion		19.81351
Log likelihood	-286.0187	F-statistic		22.16582
Durbin-Watson stat	1.949875	Prob (F-statistic)		0.000000
Durbin-Watson-h-stat	0.3323			

**Source: Own calculations.**

The coefficients of the estimated least-squares regression function applied to this case are displayed above.

In terms of the significance of these coefficients, BOND2(-2), GROECD and DPOL(-3) are not significant at the 90 percent level of confidence.

For an economic interpretation, TFDI (total FDI inflows) into Thailand is consistent with both Location Theory and Product Life Cycle Theory. Foreign investors would like to locate their affiliates to exploit economies of scale in the importing country.

First, GDP is significant at a 95 percent level of confidence, with a positive coefficient. Its coefficient of 73.192 tells us that if the Thai GDP changes 1 billion Baht or 1,000 million Baht, assuming other things being equal, total FDI into Thailand will change 73.192 million Baht in the same direction as GDP.

This highlights the fact that foreign capital inflows into Thailand during the period under consideration were affected positively by the market size of the host country. It should be well understood that while changes in the legal framework have been necessary for further progress, the economic environment, and especially the market size and conditions play a decisive role in attracting foreign capital. It also implies that larger economies are much more likely to receive investment than small ones.

Second, in terms of TARIFF (the average tariff rate faced by foreign exporters to Thailand), the statistical evidence indicates that there is a high degree of negative influence on total FDI in Thailand; as this variable is statistically different from zero at the 99 percent level of confidence. Its coefficient of 7496.083 indicates that a change in the tariff rate of 1 percent can lead to a change in total FDI in Thailand of 7,496 million Baht in the opposite direction. It seems that the tariff has become an obstruction to total FDI, instead of a favourable factor. This can be implied by the more liberalized policies that would induce more FDI into Thailand. Since the tariff rate covers intermediate products and capital used in the production process, higher tariff rates or more protectionism do not encourage FDI into Thailand.

Nevertheless, there is a consequence to discuss about tariff rates. According to Exhibit 1.1 in chapter 1, before the 1980s the value of FDI into Thailand increased steadily. During that time firms entered Thailand to produce import-substitution goods in order to avoid import duties. These firms invest in the host country if they believe that locating their affiliates in the host country will be of more benefit than exports to that country. However, according to the Exhibit 1.1, again, after the period of 1980-84, the FDI value into Thailand increased sharply. This was due to the fact that the strategy of foreign enterprises changed to be export-oriented. This means that such foreign firms in Thailand had to import raw materials or intermediate goods to produce their final products and export them to other countries, including their home, country. This type of firm after 1980 preferred lower tariff rates because otherwise their raw materials would cost them more. In other words, if import tariffs are imposed on final goods, it will reflect a positive effect on FDI. However, if a tariff is imposed on raw materials or intermediate goods, the tariff rate will have a negative impact on FDI.

Third, infrastructure lags for two periods, EGKC (-2), and this is significant for at least a 95 percent level of confidence. It indicates that the level of electricity generated in Thailand may enhance the internalization and location-specific advantages. However, the sign of its coefficient is negative, instead of positive as expected. This may be caused by the electricity generated per capita in Thailand changing slowly over time, while the regression study requires some degree of variation in an explanatory variable. Therefore, its impact on total FDI cannot be fully revealed. However, its coefficient of 7.984 means that a change in electricity generating 1 kilowatt-hours per capita will lead to a change in FDI into Thailand of 7.984 million Baht. On the contrary, using the total electricity consumed in Thailand may not be a suitable variable. If electricity consumed is classified by industry and this had been employed, the sign of the EGKC coefficient might have been positive.

Fourth, the analysis shows that total Thai exports,  $TEXPT(-1)$ , lagged for one period and is statistically significant at the 95 percent level of confidence with the positive sign as expected. It confirms the hypothesis that an export-oriented strategy is one of the motives for FDI. This variable coefficient of 3.98 indicates that a change in previous total exports of \$ US 1 million, or approximately 40 million Baht, will change the present FDI by 3.98 million Baht in the same direction, holding other factors constant.

Fifth, the relative labour cost,  $WAGE2(-1)$ , lagging for one period shows a coefficient significant at the 90 percent level of confidence and its sign is negative as expected. The coefficient of 1951460.9 means that a change in the ratio between Thai and the U.S. wages of 1 percent will lead to a change in total FDI in Thailand of 1,951,461 million Baht in the opposite direction. Thus, the theory of cost-advantage is crucial here. For example, the rise in the minimum wage every year without a certain formula can discourage FDI, because foreign firms have to pay higher wages, which leads to higher cost of production.

Sixth,  $BOND2(-2)$  is not significant and its sign is not the same as expected. It indicates that the US long-term government bond yield acting as a cost-of-capital variable does not seem to have any influence on the inflow of FDI into Thailand.

Seventh, the exchange rate,  $EXRT$ , is significant at least at a 90 percent level of confidence and the sign of its coefficient is positive as expected. Its coefficient of 7089.33 shows that a change in the Thai/US exchange rate of 1 Baht will lead to a change in total FDI in Thailand of 7089.33 million Baht in the same direction. Therefore, a weakening of the Thai Baht results in increase in exports and decrease in imports, which lead to a rise in total FDI. In other words, a result of rising production costs in the OECD countries due to the strong value of their currencies contributed to the recent flow of FDI into Thailand because investing in Thailand is much less expensive.

Eighth, GROECD, the average growth rate of OECD countries, is not significant in this equation. However, its coefficient sign is positive as expected. In this case, if it were significant with its coefficient of 3040.624, it would have explained that a change in the average growth rate of OECD countries of 1 percent would lead to a change in FDI inflow in Thailand of 3040.624 million Baht in the same direction.

Ninth, the effect of the EC 1992 programme, DEU, on total FDI in Thailand is negative, which is as expected. This variable is significant at least at a 90 percent level of confidence. Its coefficient of 39582.187 can be explained that after this programme was implemented, total FDI in Thailand increased about 39,582.187 million Baht. Foreign investors may have diverted their investment from outside their integrated low-wage countries in the European Union. The study by Davenport(1990) states that much of the diversion of direct investment would take place in Portugal and Spain where labour costs are attractive.

Tenth, the analysis of political stability in Thailand DPOL(-3) lagged for three periods, which indicates that frequent changes in government and political crises during 1970-1997 did not have any impact on FDI. This may be because the Government policy on FDI remained on the same tracks.

Finally, TFDI(-1), the former period of total FDI in Thailand, undoubtedly influences the current total FDI. It is significant at a 95 percent level of confidence and has a positive sign as expected. Its coefficient of 0.395 indicates that a change in a previous year of total FDI leads to a change in a present year's FDI in the same direction, other things being equal. As direct investment is a long-term investment, it certainly is carried on by the firms' own investment.

The results of the foregoing quantitative analysis seem to indicate that the main determinants of FDI in Thailand during the period 1970 - 1997 were the size of the market (as measured by the level of GDP), total exports lagged for one period, the exchange rate

of the Thai baht, total FDI lagged for one period, import tariff rates, the infrastructure (as electricity generation per capita), relative wages compared with the US and the EC 1992 programme. The first four variables stimulated foreign investors to invest more in the Thai market, while, on the other hand, the last four variables encouraged prospective investors to invest at home or in other countries.



## 5.2 Empirical Results of Foreign Direct Investment from European Union in Thailand

The other model in this study focuses on FDI from European Union into Thailand.



**Table 5.2: Empirical Results of Foreign Direct Investment from EU in Thailand.**

LS // Dependent Variable is FDI				
Date: 09/01/98 Time: 18:15				
Sample(adjusted): 1972 1997				
Included observations: 26 after adjusting endpoints				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3743.185	3908.156	0.957788	0.3544
GDP(-1)	22.69657	4.312707	5.262721	0.0001
TARIFF(-3)	-187.1211	83.90280	-2.230213	0.0426
EGKC(-1)	-1.607550	0.282142	-5.697656	0.0001
DISCOUNT(-1)	-275.1981	106.0933	-2.593927	0.0212
EXPT(-1)	3.543962	0.468152	7.570114	0.0000
WAGE1(-3)	-28712.45	17497.68	-1.640929	0.1231
EXRT(-1)	520.1902	151.1417	3.441738	0.0040
GREU(-1)	559.2064	192.7097	2.901806	0.0116
DEU(-1)	-3472.780	1142.507	-3.039613	0.0088
DPOL(-1)	-999.0825	435.7122	-2.292987	0.0379
FDI(-2)	0.202741	0.140250	1.445572	0.1703
R-squared	0.980777	Mean dependent var.		3091.215
Adjusted R-squared	0.965673	S.D. dependent var.		3306.093
S.E. of regression	612.5387	Akaike info criterion		13.13926
Sum squared resid	5252851.	Schwarz criterion		13.71992
Log likelihood	-195.7028	F-statistic		64.93526
Durbin-Watson stat	2.442314	Prob(F-statistic)		0.000000
Durbin-Watson-h stat	-1.613			

Source: Own calculations.

First,  $GDP(-1)$ , lagged for one period is strongly significant at a 99 percent level of confidence with a positive sign as expected. Its coefficient of 22.697 indicates that, other things being equal, a change in the previous GDP of 1 billion Baht leads to a change in FDI from EU of 22.697 million Baht in the same direction. Therefore, the size-of-market hypothesis is valid in this case.

Second,  $TARFF(-3)$ , the average tariff rate lagged for three periods is significant at a 95 percent level of confidence. The coefficient carries an unexpected negative sign, indicating that protectionism is not an incentive for EU investors. They tend to prefer more liberalized policies and more competitive markets. Its coefficient of 187.121 implies that a change of 99 percent over the last three periods in the average tariff rate will effect a change in FDI from the EU into Thailand of about 187.121 million baht in the opposite direction, *ceteris paribus*.

Third,  $EGKC(-1)$ , the electricity generated per capita, lagged for one period and is strongly significant at the 99 percent level of confidence with a negative sign, which is different from the expectation. This is because of the steady change of the electricity generation data compared with other variables' data. Its coefficient of 1.608 shows that, other things being equal, a change in electricity generating of 1 kilowatt-hours per capita will lead to a change in FDI from EU into Thailand of 1.608 million Baht in the opposite direction.

Fourth, the analysis also supports the cost-of-capital hypothesis since the coefficient of the central bank's discount rate lagged for one period,  $DISCOUNT(-1)$ , is negatively significant at a 95 percent level of confidence. This result suggests that some EU investors finance some of their projects through the local financial market. Its coefficient of 275.198 can explain that a change in the Thai central bank's previous discount rate of 1 percent leads to a change in FDI from the EU of 275.198 million baht in the opposite direction, holding other factors constant.

Fifth, the coefficient for Thai exports to EU lagged for one period, EXPT(-1), is positively significant, as predicted, at the 99 percent level of confidence. This is because EU affiliates locate in Thailand for exporting their products back to their own countries. Its coefficient of 3.544 indicates that a change in the value of Thai exports to EU of \$US 1 million, or approximately 40 million Baht, leads to a change in FDI from EU into Thailand of about 3.544 million baht in the same direction, other things being equal.

Sixth, WAGE1(-3), Thai wages compared to German wages have a negative sign as expected. However, its coefficient is not significant in this analysis (though Thai workers' wages average just \$US 1,313 per year compared to \$US 20,000 in Western Europe).

Seventh, the average growth rate in EU lagged for one period, GREU(-1), has a positive coefficient as expected and it is also a significant influence on EU investment in Thailand. It is statistically different from zero at the 95 percent confidence level. Its coefficient of 559.206 shows that a change of 1 percent in the average EU growth rate will lead to a change in FDI from EU into Thailand of about 559.206 million Baht, *ceteris paribus*, in the same direction.

Eighth, the EC 1992 programme lagged for one period, DEU (-1), is negative, which is different from the expectation. This means that after being strongly integrated, the flow of FDI from EU to Thailand will increase. Its coefficient of 3472.78 implies that after the announcement of the EC 1992 programme, inflow of FDI from the EU in Thailand was 3,472.78 million Baht, holding other factors constant. The result of this regression can be explained as follows. First, in fact there have been two different groups of countries in EU: one group is more developed countries such as the UK and Germany, and the second group is less developed economies such as Greece and Spain. Therefore, when these two groups are integrated together as EU, the second group is likely to cause a decline in economic performance of the first group because their economies have to

depend on each other. At the same time, such a situation also means that economies in the second group are becoming better off. This leads to the situation of less developed countries in EU losing their cost advantages because their standard of living has become higher. Finally, these changes have led to an outflow of capital from EU, to seek for a cost advantage in countries around the world, including Thailand.

Ninth, the political instability variable lagged for one period, DPOL(-1), is significant at a 95 percent level of confidence with a negative coefficient sign, different from the expectation. It indicates that during a period of political instability, flows of FDI from EU to Thailand would increase in the next period by about 999.083 million Baht, other things being equal. This result is interpreted from the coefficient of 999.083. Interestingly, the DPOL(-1) (Political instability) has given a somewhat peculiar result. It is a common sense to think that a higher degree of political stability in a host country would result in higher investment value from abroad because investment environment of a stable country would be much better than that of an instable one. However, according to the regression in this study, the result came out that a higher degree of political instability in Thailand would result in an increasing volume of FDI from EU. This can be explained by two reasons. First, in a time of political instability, there are likely to be weak and out-of-date regulations for foreign enterprises to invest in the country. Secondly, in a time of political instability, it is likely that the Parliament will have to change its members regularly. Therefore, a Government would try to do anything that seems to be valued for the country in order to retain their reputation. Thus, the Government might encourage foreign enterprises to come and invest in Thailand more easily.

Finally, FDI(-2) is not statistically significant in this model. However, it improves the confidence level of other explanatory variables' coefficients.

### **5.3 Conclusion**

This study intended to identify political and economic factors that would explain the pattern and determinants of total FDI and FDI particular from EU into Thailand, in particular during 1970 - 1997.

The high-adjusted  $R^2$ , indicates that the explanatory variables in the model can explain most of the variation in the dependent variable. This suggests that most of the explanatory variables are the appropriate major determinants of both total FDI and EU FDI in Thailand.

The results generally support the hypothesis that FDI, regardless of source, is determined by the size of the Thai market, Thai exports, average tariff rates, electricity generation, the average growth rate of home countries, the exchange rate of Thai currency and the higher degree of regional integration. We also find that total FDI seems to be sensitive to Thai wages compared with the US wages and previous total FDI, while the central bank's previous discount rates and previous political stability were found to be important factors in determining EU FDI flows in Thailand. Other variables may partly support their respective hypotheses, but are not statistically significant. It should be kept in mind that all the lagged variables reflect the fact that FDI takes a longer period to respond to changes in those variables than others.

### **5.4 Policy Implications**

In order to induce more FDI inflow into Thailand, the Government should reduce duties on raw materials and machinery to levels which will not discourage investors from coming to Thailand. Further, a policy to stimulate economic growth is also important because market size (measured by GDP) has a strong influence on FDI. Moreover, the Government should stimulate the export sector by searching for new markets and

developing a relationship with them, because the export factor is also crucial in determining FDI.

In addition, infrastructure should be improved constantly in order to induce more FDI. This would allow foreign firms to more conveniently perform economic activities in Thailand. This could also be a way to persuade firms to invest capital in Thailand; and not move to other lower-wage countries, e.g. Vietnam and China. Again, the aspect of wages is still significant. Thai minimum wages increase every year with uncertain procedures depending on the result of negotiations which means that, the production cost cannot be correctly estimated in the long-term. Further, in some cases, a weakening Thai Baht should be introduced as a method to stimulate FDI in Thailand. However, it must be at a stable rate because if it fluctuates too widely, it will reduce foreign capital inflow and will increase the foreign capital outflow at the same time.

In the particular case of EU, similarly, the same policy implications for total FDI in Thailand can be applied to induce more FDI from EU into Thailand. According to this study, lowering the Thai discount rate can also induce more FDI from EU, because some EU affiliates finance themselves through local sources.

However, most FDI from EU into Thailand was for infrastructure projects, such as electricity generation, chemical and plastic projects. Therefore, these investments can be stimulated by lowering tax duties on raw and essential materials used for these projects.

Finally, an international economic policy is also important. The EC 1992 programme brought EU to a wider domestic market. The Thai government should make more bilateral or multilateral agreements with EU member countries and have stronger relationships with them in order to access the market more easily.



## **5.5 Government Policies**

After recommending some policies which should be useful in inducing more FDI into Thailand, we now turn to consider some existing policies of the Thai Government for encouraging more FDI. Since an economic slowdown began in 1997, the Thai Government has introduced several policies in order to balance economic activities. The Foreign exchange rate has fluctuated widely after the float of the Thai Baht in mid-1997. In order to stimulate more FDI, the Board of Investment (BOI) has introduced some measures, developed in order to encourage expansion of projects from existing foreign investors. The most recent announced measures (1997) are as follows:

### **Incentive Enhancement**

First, BOI-promoted projects in the three sectors of textiles, footwear and food processing are eligible for exemption from import duty on replacement machinery utilizing higher technology. This measure is aimed at enhancing the technological capabilities and product quality for companies in Thailand. The new machinery must be imported within two years of approval. Second, existing projects in Zone 1 or Zone 2, which greatly contribute to the Thai economy, either through large-scale job creation or by generating foreign exchange earnings, are eligible to be exempted from corporate income tax for expansion of previously-approved projects. Third, for BOI-promoted projects under section 36(1), where the exemption of import duties on raw and essential materials used for the manufacture of exports has expired, firms may apply again for this incentive. A one-year exemption from import duties on raw and essential materials used in the manufacture of exports will be granted to projects located in Zone 1 and Zone 2, while a five-year exemption will be granted to those in Zone 3.

Fourth, BOI-promoted projects may apply to increase production capacity beyond the level stipulated on their investment promotion certificates by increasing the number of working hours or by using machinery not specified on the promotion certificate. In addition, these projects may apply for corporate income tax exemption for the incremental

production, and the additional machinery will be eligible to receive import duty reduction or exemption. This measure is aimed at encouraging companies to maximize their machinery utilization. Fifth, investment projects in nineteen supporting industries may be granted 8-year corporate income tax exemption and exemption of import duties on machinery. Foreigners may also hold all or the majority of shares in these projects. Further, investment projects in agriculture and agricultural products industries, which are exported at least 80 percent of their products will be able to receive import duty exemption on machinery. Finally, investment projects located in Zone 1 and Zone 2 are eligible to receive import duties exemption for new machinery in 61 activities specified by the Board.

### Deregulation

The Board of Investment has decided to allow foreigners, on case-by-case basis, to hold all or a majority of the shares in existing manufacturing projects located in Zone 1 and Zone 2 if the existing Thai shareholders give their consent. This is an effort to alleviate the on-going financial liquidity problem.

Another measure launched to ease the financial liquidity problem is to grant investment promotion to existing non-BOI promoted companies. However, there are still some conditions in this case. For example, only non-tax incentives will be granted, including permission to own land and to bring in foreign experts and technicians.

### Facilitation

First, the BOI-promoted companies are entitled to own land for residential and business purposes. The area allowed for each purpose is as follows: office not exceeding 5 rai, residence for company executives and experts not exceeding 10 rai and residence for workers not exceeding 20 rai. Next, foreigners are allowed to obtain permanent residence permits by investing at least 10 million Baht in new investment projects (direct investment), in government bonds, in state enterprises bonds, or in condominiums



(investment in securities and assets)\*. In case of investing in condominiums, investors must directly purchase them from condominium developers. Foreign investors must hold their investments continuously for a minimum period of three years after being granted permanent residency in Thailand.

The BOI has also enhanced its services in many aspects. First, a Foreign Expert Services Units was established in August 1997 to provide foreign companies with expedited services related to bringing in expatriates to work under the BOI-promoted projects. Second, the BOI has granted non-tax incentives to trade and investment support offices, in order to facilitate foreign companies' operation in Thailand. Finally, the BOI regularly organizes suppliers tour to a selected group of major automotive and electronics assemblers in order to encourage the increased development of subcontracting in Thailand.

---

\* under these conditions

- 8 million baht for investors
- 6 million baht for spouses
- 2 million baht for each unmarried dependents under the age of 20