

Foreign Direct Investment Leading Indicators: the Case Study of Thailand and Vietnam

Chanin Mephokee^{1*}, Anuwat Cholpaisan², and Tananat Roopsom³

¹Faculty of Economics, Thammasat University, Phranakorn, Bangkok, 10200, Thailand.

²Faculty of Economics, Dhurakitbhandit University, Laksi, Bangkok, 10210, Thailand.

³Institute of East Asian Studies, Thammasat University, Klong Luang, Pathum Thani, 12120, Thailand.

Abstract

Background: Foreign direct investment (FDI) has played the important role in economic development, both for Thailand and Vietnam. In order to explain FDI patterns in Thailand and in Vietnam for the past 20 years, ARIMAX model is employed. The ARIMAX model, as well, is used to forecast the value of FDI in these two countries.

Objective: The objective of this paper is to construct the leading indicators that are able to explain and predict the behaviors of foreign direct investment inflow to Thailand and Vietnam. The paper introduces ARIMAX model to explain and predict the value FDI inflow to these two countries. Data used in this paper is quarterly data during the period of 1988-2010.

Result: The study finds that GDP per capita, real interest rate, degree of openness, and exchange rate are the leading indicators for explaining and forecasting the FDI values to these two countries. Among these factors, degree of openness is the most important factor to explain the FDI pattern.

Discussion and Conclusion: The study finds that investment promotion policies and the reduction in trade transaction costs play the important role in FDI decision. The model forecasts that the value of FDI to both countries would be converge the same in the first quarter of 2012.

Keywords: Foreign Direct Investment, Leading Indicator, ARIMAX model

Statement of the Problem

During 1970s, most of the developing countries in Asia emphasized on domestic protection and import-substitution policies, and considered the effects of foreign direct investment (FDI) on economic development in the negative way. However, today is the period of free market promotion that almost all of Asian

countries are focusing on FDI promotion and trade barriers minimization.

Under the current free trade policies, more FDI has flown into the developing Asian countries. According to UNCTAD, in 1980, only 545 million US dollars worth of FDI has flown into these countries, however, in 2000, the value of FDI has reached to 357,847 million

* Corresponding author: chaninme@yahoo.com

dollars. This data shows the end of protectionist policy that created high consumer cost in the long run. Gradually, these countries turned to choose free trade policies by promoting investment from abroad. (Brooks, et al., 2003)

Thailand and Vietnam are the two countries that can well represent the good examples of the changes in policies of these developing countries in Asia.

Table 1 Foreign Direct Investment inflow to Thailand, Vietnam, and Asian developing countries, 1988-2010. (millions of USD)

	2531-2533	2541-2543	2551-2553
Thailand	1,105 (-)	6,102 (452%)	9,675 (58%)
Vietnam	76 (-)	1,412 (1,757%)	9,003 (537%)
Asian Developing Countries	18,031 (-)	50,492 (180%)	82,000 (62%)

Source: 3-year average estimated from the data of United Nations Conference on Trade and Development (UNCTAD), Foreign Direct Investment database. Numbers in parentheses represent the growth rates. $\frac{X_{t+1} - X_t}{X_t} \times 100$

From Table 1, during the period of 2008-2010, the value of FDI inflows into Thailand and Vietnam were in the similar amount; 9,675 and 9,003 million US dollars respectively. However, as percentage of FDI to GDP, it was found that role of FDI to Vietnam economy is much more important than those in Thailand or in other Asian developing countries. This implies that

Vietnam depends heavily on FDI. FDI may be very important for the country like Vietnam that faces problems of over labor supply in agricultural sector, lack of infrastructure and transportation networks, and over-investment in unprofitable state-enterprises. (Samai Krothinthakom, et al., 2008; Tien, 2009)

Table 2 Foreign Direct Investment inflow as percentages on GDP, 1988-2010

	1988-1990	1998-2000	2008-2010
Thailand	2.45 (-)	4.97 (102%)	3.03 (-39%)
Vietnam	0.78 (-)	4.92 (1,171%)	9.51 (93%)
Asian Developing Countries	1.36 (-)	3.24 (138%)	3.05 (-6%)

Source: estimated from the data of United Nations Conference on Trade and Development (UNCTAD), Foreign direct investment database. Numbers in parentheses represent the growth rates.

Since FDI has played very important role for economic development in both Thailand and Vietnam, this article aims to explain the behaviors of FDI in Thailand and in Vietnam for the past 20 years. In this article, the leading indicators are constructed in order to explain the factors affecting the value of FDI and forecast the future value of FDI flow into these two countries. The article is divided into 4 parts. The second one would be literature review on factors affecting the value of FDI. In the third part, Autoregressive Integrated Moving Average with External model (ARIMAX) is employed to estimate the FDI in the future by constructing FDI Leading Indicators. Results of the study and conclusion would be in the fourth part.

Literature Review

In general, capital flows from one country to others can be explained by the difference in expectation on rate of return and/or the risk diversification reason. (Cooper, 2002) The incentives for FDI to the host countries can be considered into; (1) Import-substituting FDI, (2) Export-increasing FDI, and (3) Government-initiated FDI. (Moosa, 2002)

Chanin et al. (2011) explained the factors affecting FDI into three categories that are; size of domestic market, macroeconomic factors, and policy variables. The market size can be represented by GDP or GDP per Capita. They assumed that market size can be used to monitor the level of aggregate demand. Larger size of market is, more variety of products will be. Higher GDP per Capita implies higher pur-

chasing power of consumers. This market size as a leading variables concept can be seen in works by Fujimura and Edmunds (2006), Pham (2002), and Sufian and Sidiropoulos (2010). According to these works, market size has positive effects on the value of FDI inflow.

Macro-economic factors are domestic economic factors (tax rates, inflation rates, infrastructure development) and labor-market factors (wage rates, minimum wage rate, labor productivity). These factors would affect the decision of foreign investors on costs and economic stability. Fujimura and Edmunds (2006), Campos and Kinoshita (2003), and Chakrabarti (2001) mentioned that an increase in minimum wage rate, tax rate and inflation rate have negative relation to FDI. Meanwhile, an increase in labor productivity and infrastructure development has positive relations.

Policy variables are degree of openness and exchange rate. This concept is under assumption that degree of openness represents the free trade policy that eliminates barriers to trade, creates investment facilities, and promotes intellectual property rights protection. Therefore this policy creates positive environment for FDI inflow. Weaker domestic currency would benefit the FDI inflow on industries that are production bases for exporting. The works on this concept can be seen in works by Sufian and Sidiropoulos (2010), Fujimura and Edmunds (2006), Campos and Kinoshita (2003), and Chakrabarti (2001).

Variables used in recent works are shown in Table 3.

Table 3 Leading Variables for FDI

Variables	Effect on Investment	Fujimura and Edmunds	Campos and Kinoshitra	Chakrabarti	Pham	Sufian and Sidiropoulos
GDP	(+)	(+)	(+)	(NA)	(+)	(+)
GDP per Capita	(+)	(+)	(NA)	(+)	(+)	(+)
Min. Wage	(-)	(NA)	(-)	(-)	(NA)	(NA)
Productivity	(+)	(NA)	(+)	(NA)	(NA)	(NA)
Openness	(+)	(+)	(NA)	(NA)	(+)	(+)
Exchange Rate	(+)	(NA)	(NA)	(+)	(+)	(+)
Tax Rate	(-)	(-)	(NA)	(NA)	(-)	(NA)
Inflation Rate	(-)	(-)	(-)	(NA)	(NA)	(-)
Facilities	(+)	(+)	(NA)	(+)	(-)	(+)

Source: collected by researcher. Degree of Openness

Methodology

ARIMAX model is applied to explain the FDI behaviors in Thailand and in Vietnam in the past and to forecast the volume of FDI to these two countries in the future. The ARIMAX model consists of three steps that are (1) testing the ability of being the leading variables, (2) testing the stationary of the data, and (3) estimating and forecasting (see Gujarati; 1995, Kamonwan; 2012)

Leading Variables Test

Theoretically, several variables can be

the leading variables for FDI inflow such as minimum wages, labor productivity, and investment-facilitating index. However, with the limitation of data availability, some variables above are not able to be collected perfectly. With data available in hand, variables used in this paper are real GDP, GDP per capita, consumer price index, real interest rate, degree of openness, tax rate, and exchange rate. Granger Causality test is used to check all these seven variables whether they are leading variables or not. The result of Granger Causality test is shown in Table 4.

Table 4 Leading Variables Test

Country	(Quarterly lag) Leading variables	Data source	Hypothesis (1)	Hypothesis (2)
Vietnam	RGDP (4)	(1)	accept	reject
	GDP PER CAPITA (4)	(1)	reject	accept
	CPI (4)	(2)	accept	reject
	R INTEREST (3)	(1)	reject	accept
	OPENESS (2)	(2)	reject	accept
	TAX (4)	(1)	reject	reject
	EXCHANGE (2)	(2)	reject	accept
Thailand	RGDP (4)	(1)	accept	reject
	GDP PER CAPITA (4)	(1)	reject	accept
	CPI (4)	(2)	accept	reject
	R INTEREST (3)	(1)	reject	accept
	OPENESS (2)	(2)	reject	accept
	TAX (4)	(1)	accept	accept
	EXCHANGE (2)	(2)	accept	reject

Source: Estimated by researchers and (1) World data bank (2) United Nations Conference on Trade and Development

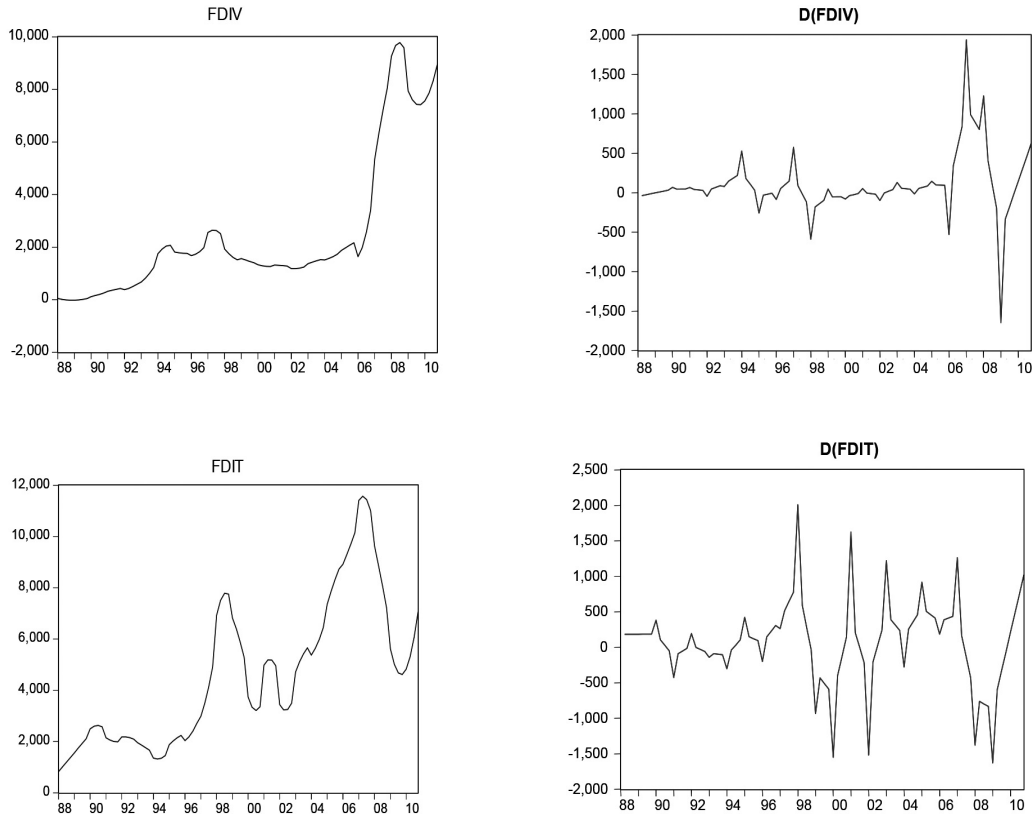
From Table 4, the test shows that the leading variables that can forecast FDI behaviors in both Thailand and Vietnam are GDP per Capita, Real interest rate, and Degree of Openness. Exchange rate can be a leading variable for Vietnamese FDI only.

Unit Root Test

In general, time-series data such as FDI may face the problem of non-stationary that

causes the problem of spurious regression. To avoid this problem, the data must be checked on stationary of data by using Unit Root test. Under Unit Root test, the non-stationary data would be rejected when MacKinnon p-value < 0.5. If data is non-stationary, data used in this model would be changed into the term of differentiations in order to transfer the non-stationary data to be the stationary ones. After using Unit Root test, it was found that data is

Figure 1 Foreign Direct Investment and its first differentiation term.



Note: Researchers disaggregate data from annual data to quarterly data by quadratic-by-average technique.

non-stationary, but the first differentiation of the data is stationary. Therefore all data are transformed to the term of first differentiation, $D(FDIV)$.

From Figure 1, it was found that the value of FDI inflows in both Thailand and Vietnam exhibit the pro-cyclical movement. This implies that in the long run the value of FDI inflows in both countries have been increasing continuously. Even if in the short run, during

the recession, FDI in both countries showed the same declining patterns. Moreover, the value of FDI inflows in both countries show the trends that are convert to the same level.

Estimation and Forecasting

Autoregressive Integrated Moving Average (ARIMA) model can be explained by this equation;

$$\Delta_d FDI_t = \sum_{i=1}^p \phi_i \Delta_d FDI_{t-i} + \sum_{j=1}^q \theta_j \varepsilon_{t-j} + \varepsilon_t$$

Where,

FDI_t = the amount of FDI at quarter t

Δ_d = first degree of differentiation

ε_t = white noise term at quarter t

ARIMAX model is developed from ARIMA model by including leading variables

into the model in order to improve the ability on forecasting. The ARIMAX model can be explained by this following equation;

$$\Delta_d FDI_t = \sum_{i=1}^p \phi_i \Delta_d FDI_{t-i} + \sum_{j=1}^q \theta_j \varepsilon_{t-j} + \sum_{k=1}^r \gamma_k X_{t-k} + \mu_t$$

Where,

X = FDI leading variables at quarter t and k is the number of lag.

In these model, the dependent variables are FDI value in Thailand and in Vietnam during the period of 1988 to 2010 which are quarterly data. Therefore there are 92 observations. In case of the FDI in Vietnam, independent variables are first differentiate of FDI in first

lag and ninth lag and SHOCK in forth lag. In case of Thai FDI, independent variables are first differentiate of FDI in first and forth lag and SHOCK in forth lag. The common independent variables in both cases are GDP per capita, real interest rate and degree of openness.

The results of ARIMA and ARIMAX model are illustrated in Table 5

Table 5 Estimation Results

Independent Variable (Quarterly lag)	Vietnam		Thailand	
	ARIMA	ARIMAX	ARIMA	ARIMAX
D(FDI) (1)				
D(FDI) (4)	15.32*	1.81*	12.01*	0.98*
D(FDI) (9)	-	-	2.81*	0.07*
SHOCK (4)	-8.36*	-0.91*	-	-
GDP PER CAPITA (4)	-7.69*	-3.38	-4.92*	1.75
R INTEREST (3)	-	2.01*	-	3.84*
OPENESS (2)	-	-0.97*	-	-0.87*
EXCHANGE (2)	-	7.23*	-	5.42*
Adjust R2	-	1.92*	-	-
Root Mean Square Error	0.30	0.39	0.32	0.41
	330.17	313.14	310.25	299.75

Source: Estimated by researchers

According to Table 5, all leading indicators have impact on FDI in the same direction as expected by theories with the significant level more than 95 percent. Considering the value of Root Mean Square Error, it is found that ARIMAX model is able to explain the FDI

behaviors better than ARIMA model in both countries. Therefore, ARIMAX model would be used for forecasting the value of FDI inflow for the next 6 quarters. The results of forecasting can be seen in Table 6.

Table 6 FDI Forecasting (millions USD)

	2554 (Q1)	2554 (Q2)	2554 (Q3)	2554 (Q4)	2555 (Q1)	2555 (Q2)
Vietnam	2108.19	2104.03	2139.84	2215.53	2331.09	2486.92
Thailand	2132.59	2128.53	2153.84	2228.78	2332.59	2469.78

Source: Estimated by researchers

Let put some remarks here that the definitions of FDI are different between these two countries. In case of Vietnam, with the definition set by the Vietnam Ministry of Planning and Investment, FDI is the total investment value of foreign investment enterprises (FIEs) that includes equity owned by Vietnamese people (TIEN, 2009). Therefore the amount of Vietnamese FDI may be overestimated. However, in case of Thailand, with the definition of the Bank of Thailand, FDI includes (1) equity capital that more than 10 percent owned by foreigners, (2) lend to affiliates, and (3) accumulated profit. Therefore, the amount of Thai FDI may be under estimated because it excludes the value of reinvestment earning.

Results of the Study and Conclusion.

This article aims to apply the econometric model by construct leading indicators to explain and forecasting the value of Thai and Vietnamese FDI. The interesting results from the study are as followings.

- (1) Country purchasing power; represented by GDP per capita, and costs of doing business in host country; represented by real interest rate, are the suitable leading indicators for FDI inflows. Meanwhile, foreign investors concern on the country liberalization policies on trade and investment; represented by the degree of openness.
- (2) The degree of openness can be considered as marginal-effect variable more than a leading variable and is able to explain case in Vietnam better than that in Thailand during 1988 to 2010. This is from the fact that Vietnamese government has changed

the investment policy to be more open to foreign investors after Thai government did (Doi Moi, 1986).

- (3) The study finds that the GDP has no impact on the inflow of FDI; on the contrary, the change in FDI inflows would affect the GDP. This finding is the same as the findings on the study of Cooper (2002) and on the study of Sufian and Sidiropoulos (2010).
- (4) Since production costs in Vietnam are relatively lower than those in Thailand, the FDI inflows in Vietnam have invested more on export-base projects. Therefore the exchange rate is the FDI leading variable in the case of Vietnam only. It is not the leading variable for Thai case.
- (5) The relatively higher production costs in Thailand may be the reason why the exchange rate is not the leading variable in case of Thailand.
- (6) If the FDI policies in these two countries will not be changed in the near future, by the first quarter of 2012, the value of FDI inflows in both countries would be converted to the same level. However, the actual value of FDI inflows in the future may be different from the predicted ones by the model because there are some important variables that cannot be included in the paper's models due to the limitation of data availability.

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