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

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Abstract

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. The study finds that GDP per capita, real interest rate, degree of openness, and exchange rate are the factors that are able to explain as a leading indicator for the FDI of these two countries. Among these factors, degree of openness is the most important factor to explain the FDI behavior. The study, as well, 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 approximately the same in the first quarter of 2012.

Key words: Foreign Direct Investment, Leading Indicator, ARIMAX model

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1. **Statement of the Problem**

During 1970s, most of the developing countries in Asia emphasized on domestic protection by imposing 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 inflow into developing Asian countries. According to UNCTAD, in 1980, only 545 million US dollars' worth of FDI has in flew into these countries, however, in 2000, FDI has reached to 357,847 million dollars. This data showed that it was the end of protectionism policy that created high consumer cost in the long run is not accepted and more and more of these countries turned to choose free trade policy by promoting investment from abroad. (Brooks, et al., 2003) Thailand and Vietnam are the two countries that can well represent of these developing countries in Asia.

Table 1

Foreign Direct Investment inflow to Thailand, Vietnam, and Asian developing countries, 1988-2010.
(Millions 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. ($\frac{x_{t+1}-x_t}{x_t}*100$)

From Table 1, during the period of 2008-2010, FDI in flew to Thailand and Vietnam were quite similar in term of amount; 9,675 and 9,003 million US dollars respectively. However, as percentage of FDI on GDP, it was found that role of FDI for Vietnam economy is much more important than those in Thailand or in other Asian developing countries. This implies that Vietnam is the country that depend heavily on FDI, when the countries is facing the problems of over labor supply in agricultural sector, underdeveloped infrastructure and transportation network, and over-invested state-enterprises that facing losses. (Samai Krothinthakom, et al.,2008 ; Tien, 2009)

Table2

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

	2531-2533	2541-2543	2551-2553
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 and its role has effects on economic cooperation pattern in this region, such as, AEC and GMS), 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 forecast the value of FDI in flows into these two countries in the future. 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.

2. Literature Review

In general, capital flows from one country to another because of the difference in expectation on rate of return and/or the reason on risk diversity. (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 explained 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 is. Higher GDP per Capita implies higher purchasing 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.

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. Weaker domestic currency would benefit industries that have production base in this country 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

3. **Methodology**

ARIMAX model is applied to explain the FDI 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 consiste 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)

3.1 Leading Variables Test

Theoretically, several variables can lead FDI 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)

|				
	RGDP (4)	(1)	accept	reject
	GDP PER CAPITA (4)	(1)	**reject**	**accept**
	CPI (4)	(2)	accept	reject
Vietnam	R INTEREST (3)	(1)	**reject**	**accept**
	OPENESS (2)	(2)	**reject**	**accept**
	TAX (4)	(1)	**reject**	reject
	EXCHANGE (2)	(2)	**reject**	**accept**
	RGDP (4)	(1)	accept	reject
	GDP PER CAPITA (4)	(1)	**reject**	**accept**
	CPI (4)	(2)	accept	reject
Thailand	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.

3.2 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 tested 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 using in this model would be changed into the term of differences in order to correct data to be stationary ones. After using Unit Root test, it was found that data is non-stationary, but the first differentiation of the data is stationary. Therefore all data are transformed to the term of first differentiation, D(FDIV).

Figure 1. Foreign Direct Investment and its first differentiation term.
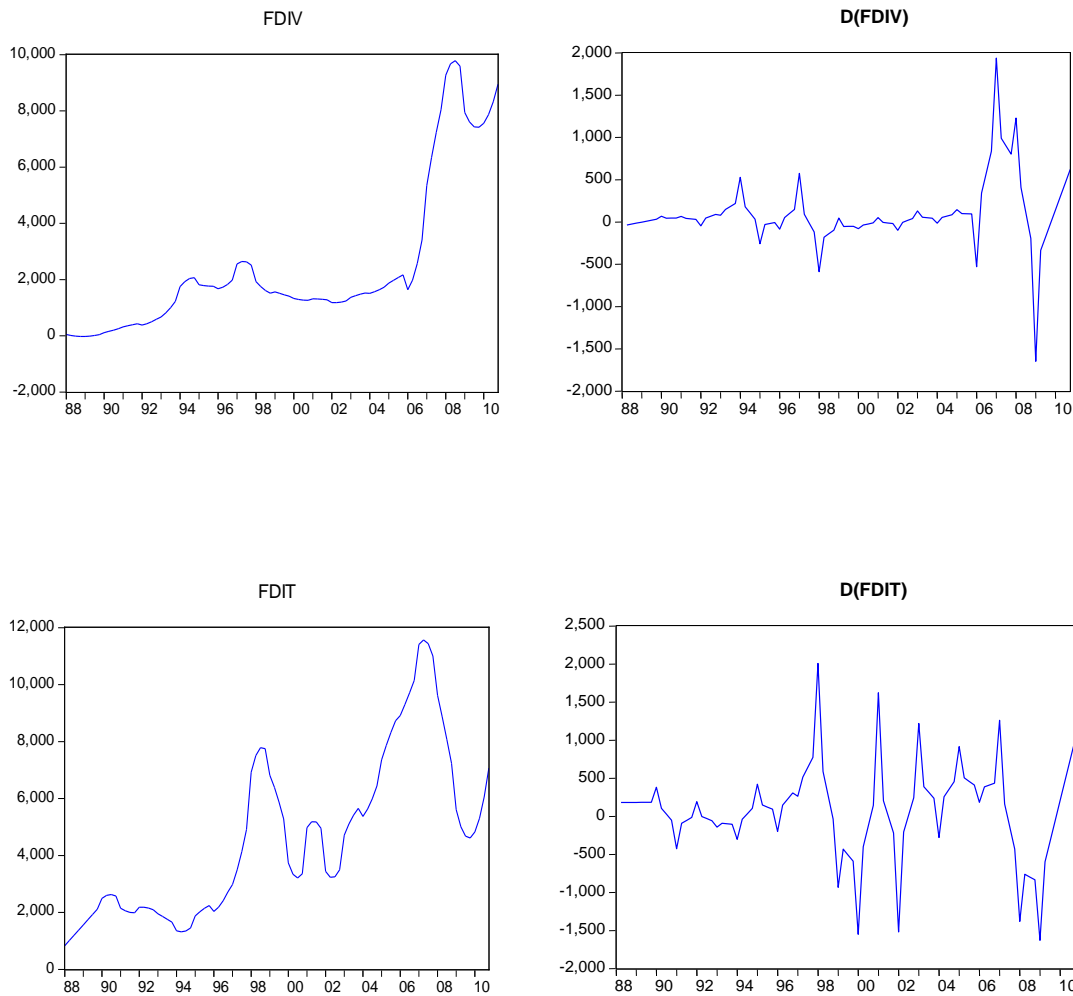
Note: Researchers disaggregate data form annual data to quarterly data by quadratic-by-average technique.

From Figure 1, it was found that FDI value both in Thailand and in Vietnam exhibits the pro-cyclical movement which is in the long run, FDI has been increasing continuously. During the recession, FDI in both countries showed the same declining patterns. Moreover, FDI in both countries show the trends that are moving to the same level.

3.3 Estimation and Forecasting

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

$$\Delta_d \text{FDI}_t = \sum_{i=1}^{p} \emptyset_i \, \Delta_d \text{FDI}_{t-i} + \sum_{j=1}^{q} \theta_j \, \varepsilon_{t-j} + \varepsilon_t$$

Where,
FDIt = amount of FDI at quarter t

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;

$$\Delta_d \text{FDI}_t = \sum_{i=1}^{p} \emptyset_i \, \Delta_d \text{FDI}_{t-i} + \sum_{j=1}^{q} \theta_j \, \varepsilon_{t-j} + \sum_{k=1}^{r} \gamma_k \, x_{t-k} + \mu_t$$

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 t0 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	
D(FDI) (1)	ARIMA	ARIMAX	ARIMA	ARIMAX
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 effects on FDI in the same direction as expected by theory with the significant level more than 95 percent. When 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 FDI 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, by the definition set by 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, by 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 by excluding reinvestment earning.

4. 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 cost to business; represented by real interest rate, are the suitable leading indicators for FDI. Meanwhile, foreign investor, as well, concern on the country free-market policy on 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 foreigners after Thai government did (Doi Moi, 1986).

(3) The study finds that GDP has no effect on the FDI, on the contrary, the change in FDI would affect GDP. This finding is the same as the study of Cooper (2002) Sufian and Sidiropoulos (2010).

(4) Since production costs in Vietnam are relatively lower than those in Thailand, the FDI in Vietnam would focus more on export-base projects. Therefore the exchange rate is the FDI leading variable in the case of Vietnam only, not the leading variable for Thai case.

(5) Since The exchange rate is the FDI leading variable in the case of Vietnam only. This may be explained by the relatively higher production cost in Thailand.

(6) Let assume that FDI policies in these two countries remain the same. In the first quarter of 2012, the value of FDI in both countries would be approximately the same. However, the

actual figures may be different from the predicted ones because there are some variables that cannot be included due to the limitation of availability of the data.

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