Does a Causal Link Exist between Foreign Direct Investment and Economic Growth in the Asian NIEs?

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This paper analyzes the causality between Foreign Direct Investment (FDI) and Gross Domestic Product (GDP) growth. In particular, by looking at the Newly Industrialized Economies (NIEs) in Asia, this paper tests the causal link between FDI inflows and GDP growth by using the Granger causality test and vector autoregressive representation (VAR) approach. The analysis of variance decomposition and the impulse response function provides insights into how a shock in one variable has an impact on the other variable. By providing reassessment of the relationship between FDI inflows and economic growth in Asian NIEs, this paper presents important implications for economic growth policy.

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CHAPTER I  Introduction

The relationship between FDI and economic growth has been intensely debated for decades and has been analyzed across regions and countries by diverse econometric methods. There is a pool of empirical and theoretical literature which explains the roles of FDI in economic growth. A positive relationship between these two factors is conventionally supported by some empirical studies, though there are still conflicting views on heterogeneous impacts of FDI in economic growth.

Another interesting aspect related to FDI and economic growth is the causality between these two factors. It is important to determine the direction of causality between these two variables because it can provide a government with guidelines for their future economic policy making. However, this causality is still controversial and ambiguous since it varies across countries. There is no uniform pattern of the impact of FDI on promoting economic growth.

The impact of FDI can be analyzed by either microeconomic or macroeconomic perspectives. Through analysis at the firm level, foreign firms’ positive spillover effects on domestic firms, such as technology transfer, can be measured. According to Aitken and Harrison’s (1999) empirical study in Venezuela during 1979-1989, there is no significant spillover of technology transfer from foreign firms to domestic firms. Micro-level analysis of the impact of FDI on promoting economic growth is generally insignificant (Carkevic and Levine, 2002).
Another way to examine the impact of FDI on economic growth is from a macroeconomic view. Many panel data analyses examine the level of contribution of FDI to macroeconomic growth. Most empirical studies analyze a large number of countries from across Latin America, Asia, and Africa. The empirical evidence of the level of contribution of FDI to economic growth varies and some studies show that no significant relationship exists between the level of FDI inflow and GDP growth rate.

This study selects a sample of countries from Asia and then divides them into three categories based on their income level. The first group of countries includes Singapore from among the countries represented as the first tier of East Asian Newly Industrialized Economies (NIEs) for impressive economic growth performance for the last few decades. The second group of countries includes Thailand, Indonesia, and Malaysia as the second tier of Newly Industrialized Economies (NIEs) of Southeast Asia. Finally, the third group includes the Philippines, which recently emerged as a third tier of Newly Industrialized Economies (NIEs). This categorization of developing countries according to national income level helps in the comparative analysis of different degrees and patterns of the impact of FDI on economic growth. This paper focuses on only the macroeconomic perspective of economic growth and its correlation with the inflow of FDI.

Through looking at some countries in Asia, this paper examines similarities and differences in magnitude of impact and causality of FDI inflow and GDP growth according to their level of economic development. There is much literature that

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1 East Asian Newly Industrialized Economies (NIEs) are South Korea, Singapore, Taiwan, and Hong Kong.
analyzes the role of FDI in economic growth. However, by focusing on the Newly Industrialized Economies (NIEs) in the Asian region, reassessment of the relations and causality between FDI and economic growth has critical value for government policy implementation. Carkovic and Levine (2002) emphasize the importance of policy implications concerning the relationship between FDI and economic growth. They argue as follows:

“If FDI has a positive impact on economic growth after controlling for endogeneity and other growth determinants, then this weakens arguments for restricting foreign investment. If, however, we find that FDI does not exert a positive impact on growth, then this would suggest a reconsideration of the rapid expansion of tax incentives, infrastructure subsidies, import duty exemptions, and other measures that countries have adopted to attract FDI.”

(p. 3)

Through understanding the important role of FDI analysis in terms of economic growth policy, this paper presents insights for possible and effective government economic policy toward inflow of FDI.
CHAPTER II  Literature Review

With increasing interest in economic growth and development, there is a growing body of empirical and theoretical literature that analyzes the impact of FDI on economic growth. Many empirical studies present evidence proving a positive association between these two variables through diverse econometric analysis methodologies. Using a sample of developing countries from Africa, Asia, and Latin America, these studies analyze how and to what degree FDI has an impact on economic growth.

There is an overall agreement that FDI has a positive effect on economic growth, even though there are some discrepancies about the level of significance of FDI in promoting economic growth by regions and countries in empirical studies. These empirical studies are based on a theoretical framework of a neo-classical growth theory model or an endogenous growth theory model (Weinhold and Nair-Reichert, 2001). However, the complexity in causality of FDI and economic growth, as well as heterogeneity in the significant level of impact of FDI on economic growth still creates conflicting arguments and evidence.

Balasubramanyam, Salisu, and Sapsford (1996) claim that the new growth theory suggested by the Romer-Lucas model implies a critical role of FDI in economic growth and emphasizes positive impacts of FDI for stimulating economic growth as follows:
“FDI has long been recognized as a major source of technology and know-how to developing counties. Indeed, it is the ability of FDI to transfer not only production know-how but also managerial skills that distinguishes it from all other forms of investment, including portfolio capital and aid. Externalities, or spill-over effects, have also been recognized as a major benefit accruing to host countries from FDI.” (p. 95)

In sum, they consider FDI as a critical source that stimulates enhancement of human capital and the transfer of new technology. However, in order to create these positive outcomes from FDI in host countries, Balasubramanyam, Salisu, and Sapsford (1996) argue that an efficient and conducive economic environment of a recipient country for economic activities is required. They claim that countries with an export-promoting policy that increases trade openness have a more productive and effective impact from the inflow of FDI on economic growth than countries with an import-substitution policy.

Similarly, Barrell and Pain (1997) also point out significant influences of FDI in the economic growth process through technology diffusion and innovation. They argue that FDI acts as a critical channel for new technology and knowledge transfers. Inflow of FDI promotes a spillover effect of technology enhancement; as a result, FDI plays a role as a catalyst to increase the level of manufacturing productivity and to accelerate the economic growth process in host countries. FDI is a major source for technology transfer and development to host countries.
Borensztein, De Gregorio, and Lee (1998) examine the correlations between FDI, human capital, and economic growth. They state that the level of human capital in a host country is an important factor in determining the effectiveness of FDI on economic growth. They also state that FDI strongly interacts with human capital in a host country, whereas domestic investment has little interaction with human capital. Through the empirical investigation of 69 developing countries for a period of two decades, 1970-1979 and 1980-1989, using seemingly unrelated regression techniques (SUR), they present two significant characteristics of FDI on economic growth. FDI creates capital spillover effects by increasing domestic investment, which contributes to capital accumulation for economic growth. Another important characteristic of FDI is its higher productivity and efficiency associated with the level of human capital compared to domestic investment (Borensztein, De Gregorio, and Lee, 1998).

The importance of human capital for economic growth has been emphasized in theoretical and empirical literature. Blomsrtöm, Lipsey, and Zejan (1992) also find that the degree of educational attainment is significantly related to income growth from their study of 78 developing countries and 23 developed countries for the time period of 1960-1985. They claim that the level of enrollment in secondary education and participation rate is the most significant variable that is positively related to economic growth.

In order to measure the magnitude of the impact of FDI on income growth, Blomsrtöm, Lipsey, and Zejan (1992) divide 78 developing countries into two subgroups: higher-income developing countries and lower-income developing
countries. From this categorization of developing countries based on income level, they find that the level of influence of FDI on income growth depends on the initial level of development of a host country. They suggest that “a certain threshold level of development is needed if the host countries are to absorb new technology from investment by foreign firms” (p. 23). The coefficient for FDI in the regression equation for higher income countries is .457, whereas for lower income countries it is .100. They also perform the causality test in order to examine the direction of the causal link between FDI and economic growth. Their findings suggest a causal relationship from FDI to economic growth exists.

FDI plays an important role for technology transfer to domestically owned firms. “Foreign direct investment by multinational corporations (MNCs) is often suggested as a vehicle for the international diffusion of technology” (Blomström, Lipsey, and Zejan, 1992, p. 11). The effectiveness and magnitude of technology diffusion from MNCs on the host country economy can be measured by analyzing the level of adaptation of new technology in domestic firms’ production.

Regarding causality of FDI and economic growth, it is an ongoing debated issue. Hansen and Rand (2004) analyze the causal links between FDI and GDP and the causality of these two variables by looking at a sample of 31 developing counties in Asia, Latin America, and Africa for the period of 1970-2000. They conclude that “When allowing for country specific heterogeneity of all parameters, a strong causal link from FDI to GDP exists” (Hansen and Rand, 2004, p. 18). Similar to the literature discussed earlier, their empirical research points out that FDI promotes gross capital
accumulation as well as that a higher ratio of FDI in gross capital formation creates a positive effect on GDP growth.

However, Hansen and Rand (2004) suggest that there is no variance of the impact of FDI on GDP: “on average, FDI has a significant long run impact on GDP irrespectively of the level of development” (Hansen and Rand, 2004, p. 18). According to their findings, the impact of FDI does not vary across regions including Africa, Asia, and Latin America. This conclusion completely contrasts the results obtained from the regression analysis by Blomsrtöm, Lipsey, and Zejan (1992), which was previously mentioned.

As discussed, there is an inconsistent causality between FDI and economic growth. Whereas previous empirical studies support the conventional view of the role of FDI as a critical factor for economic growth, Carkovic and Levine (2002) argue that there is no statistical evidence for this positive view on FDI for economic growth. Through the combination of the microeconomic approach analysis of FDI on productivity growth which measures the total factor productivity (TFP), and macroeconomic approach analysis of FDI on GDP growth, they conclude that FDI does not have a positive influence on TFP or GDP. They argue that FDI cannot be viewed as an independent variable for economic growth while disregarding other economic growth determinant factors.

Carkovic and Levine (2002) claim that “previous macroeconomic studies do not fully control for endogeneity, country-specific effects, and the inclusion of lagged dependent variables in the growth regression” (p. 13). Thus, these uncontrolled factors
result in inaccuracy in the statistical tests. By correcting the factors that used to be uncontrolled in other studies, they perform the simple ordinary least squares (OLS) regressions and dynamic panel procedure with data averaged over five-year periods on 72 countries over the years 1960-95. Carkovic and Levine (2002) conclude that “while FDI flows may go hand-in-hand with economic success, they do not tend to exert an independent growth effect” (p. 11). This finding disputes generally accepted views on the positive influence of FDI on economic growth.

Choe (2003) also examines the causality of FDI and Gross Domestic Investment (GDI) and economic growth by applying the panel VAR model. He argues that GDI rates and FDI inflows play catalyst roles for economic growth through capital accumulation, which is necessary for long-run growth. He analyzes GDI rates and FDI inflows in terms of their relationship to economic growth. In his empirical study, he tests Granger causality between FDI inflow and GDI rates and GDP growth. From a sample of 80 countries comprising high income OECD countries and developing countries over the period of 1971 to 1995, he concludes that overall causality of FDI and GDI is bi-directional. However, more significant effects are observed from economic growth to FDI rather than from FDI to economic growth.

In sum, the correlation and causality of FDI and economic growth are heterogeneous across countries, and an application of different econometrics methodologies creates variation in test results. In addition, there are still many other variables that can affect the results of empirical studies due to country specification.
Therefore, it is critical to understand these variations when examining the relationship and causality between FDI and economic growth.
CHAPTER III  Methodology

This paper measures the level of impact of FDI on GDP growth and vice versa in order to determine the causal relationship of these two variables by using several econometric methodologies: the Granger causality test and the vector autoregressive representation (VAR) approach. The data used for these tests are GDP annual growth rate and FDI net inflows as a percentage of GDP with and without Export of goods and services as a percentage of GDP.

Looking at Singapore, Indonesia, Malaysia, Thailand, and the Philippines, this paper tests the causal relationship between the two variables of GDP growth and FDI inflow. Data for Thailand, Indonesia, Malaysia, and the Philippines covers 33 years, from 1970 to 2002; and data for Singapore covers 31 years, from 1972 to 2002. These data are obtained from *World Development Indicators 2003* published by the World Bank.

3.1 Granger Causality test

In each following equation, suppose that $y_{1t}$ and $y_{2t}$ have vector autoregressive representation (VAR) with lag length of $p$. These equations can be written as follows:

$$y_{1t} = \mu_{10} + \pi_{11,1}y_{1t-1} + \ldots + \pi_{11,1}y_{1t-p} + \pi_{12,1}y_{2t-1} + \ldots + \pi_{12,1}y_{2t-p} + \epsilon_{1t}$$  

$$y_{2t} = \mu_{20} + \pi_{21,1}y_{1t-1} + \ldots + \pi_{21,1}y_{1t-p} + \pi_{22,1}y_{2t-1} + \ldots + \pi_{22,1}y_{2t-p} + \epsilon_{2t}$$
Each equation, $y_{1t}$ and $y_{2t}$, shows the systematic dependences on lags of itself and lags of the other variable. In other words, $y_{1t}$ depends on lags of itself and lags of $y_{2t}$, and $y_{2t}$ depends on lags of itself and lags of $y_{1t}$. Each equation assumes that $E\{\varepsilon_{it}\} = 0$ and $E\{\varepsilon_{it}^2\} = \sigma_i^2$ for $i = 1, 2$ and $E\{\varepsilon_{it}\varepsilon_{is}\} = 0$ for $t \neq s$ and for $i = 1, 2$. Another assumption should be made for VAR model is that there is no serial correlation between two equations of $y_{1t}$ and $y_{2t}$, which can be expressed as $E\{\varepsilon_{it}\varepsilon_{is}\} = 0$ for $t \neq s$ (Patterson, 2000, p. 537-540).

Equations (1) and (2) can be written in matrix form in the following way:

$\begin{pmatrix}
    y_{1t} \\
    y_{2t}
\end{pmatrix} =
\begin{pmatrix}
    \mu_{1t} \\
    \mu_{2t}
\end{pmatrix} +
\begin{bmatrix}
    \pi_{11.1} & \pi_{12.1} \\
    \pi_{21.1} & \pi_{22.1}
\end{bmatrix}
\begin{pmatrix}
    y_{1t-1} \\
    y_{2t-1}
\end{pmatrix} +
\ldots
\ldots+
\begin{bmatrix}
    \pi_{11.p} & \pi_{12.p} \\
    \pi_{21.p} & \pi_{22.p}
\end{bmatrix}
\begin{pmatrix}
    y_{1t-p} \\
    y_{2t-p}
\end{pmatrix} +
\begin{pmatrix}
    \varepsilon_{1t} \\
    \varepsilon_{2t}
\end{pmatrix}
\tag{3}
$

The above matrix form of the VAR model can be written in another form as follows:

$y_t = \mu + \Pi y_{t-1} + \ldots + \Pi_p y_{t-p} + \varepsilon_t \tag{4}$

where $y' = (y_{1t}, y_{2t})$, $\mu' = (\mu_{1t}, \mu_{2t})$, $\varepsilon' = (\varepsilon_{1t}, \varepsilon_{2t})$ and the $\Pi_i$ are $2 \times 2$ matrix defined above in the equation (3) (Patterson, 2000, p. 537-540).

Applying the VAR model with lag length of 2, this paper tests Granger-causality between FDI and GDP growth.\(^2\) Therefore, each equation of $y_{1t}$ and $y_{2t}$ in which the lag length runs from 1 to 2, can be written as follows:

$y_{1t} = \mu_{10} + \pi_{11.1} y_{1t-1} + \pi_{11.2} y_{1t-2} + \pi_{12.1} y_{2t-1} + \pi_{12.2} y_{2t-2} + \varepsilon_{1t} \tag{1}'$

$y_{2t} = \mu_{20} + \pi_{21.1} y_{1t-1} + \pi_{21.2} y_{1t-2} + \pi_{22.1} y_{2t-1} + \pi_{22.2} y_{2t-2} + \varepsilon_{2t} \tag{2}'$

\(^2\) The lag length was selected by AIC criteria.
In addition, the general matrix form of the VAR model (3) which has lag length \( p \) can be written as the following VAR model with lag length 2 which is used in this paper.

\[
\begin{bmatrix}
    y_{1t} \\
    y_{2t}
\end{bmatrix} = \begin{bmatrix}
    \mu_{1t} \\
    \mu_{2t}
\end{bmatrix} + \begin{bmatrix}
    \pi_{11.1} & \pi_{12.1} \\
    \pi_{21.1} & \pi_{22.2}
\end{bmatrix} \begin{bmatrix}
    y_{1t-1} \\
    y_{2t-1}
\end{bmatrix} \\
+ \begin{bmatrix}
    \pi_{11.2} & \pi_{12.2} \\
    \pi_{21.2} & \pi_{22.2}
\end{bmatrix} \begin{bmatrix}
    y_{1t-2} \\
    y_{2t-2}
\end{bmatrix} + \begin{bmatrix}
    \varepsilon_{1t} \\
    \varepsilon_{2t}
\end{bmatrix}
\]

(3)

In the Granger-causality in bivariate system where lag length runs from 1 through \( p \), hypotheses can be written as follows:

\[ H_0 : \pi_{12.1} = \pi_{12.2} = \cdots = \pi_{12.p} = 0 \]  \hspace{1cm} (5)

\[ H_A : \text{At least one } \pi_{12.i} \neq 0 \]  \hspace{1cm} (6)

If \( H_0 \) (5) is rejected, it implies that \( y_{2t} \) does Granger-cause \( y_{1t} \). If \( H_0 \) is not rejected, it implies that \( y_{2t} \) does not Granger-cause \( y_{1t} \).

\[ H_0 : \pi_{21.1} = \pi_{21.2} = \cdots = \pi_{21.p} = 0 \]  \hspace{1cm} (7)

\[ H_A : \text{At least one } \pi_{21.i} \neq 0 \]  \hspace{1cm} (8)

If \( H_0 \) (7) is rejected, it implies that \( y_{1t} \) does Granger-cause \( y_{2t} \). If \( H_0 \) is not rejected, it implies that \( y_{1t} \) does not Granger-cause \( y_{2t} \).

\[ H_0 : \pi_{12.1} = \pi_{12.2} = \cdots = \pi_{12.p} = 0 \text{ and } \pi_{21.1} = \pi_{21.2} = \cdots = \pi_{21.p} = 0 \]  \hspace{1cm} (9)

\[ H_A : \text{At least one } \pi_{12.i} \neq 0 \text{ and at least one } \pi_{21.i} \neq 0 \]  \hspace{1cm} (10)

If \( H_0 \) (9) is rejected, it implies that \( y_{2t} \) does Granger-causes \( y_{1t} \) and \( y_{1t} \) does Granger cause \( y_{2t} \). If \( H_0 \) is not rejected, it implies that \( y_{2t} \) does not Granger-cause \( y_{1t} \) and \( y_{1t} \) does not Granger-causes \( y_{2t} \).

Since Granger-causality tests in this paper use VAR model with a lag length of 2, the above hypothesis can be written as follows:
By applying the VAR models described above, this paper performs hypothesis tests and uses F-statistic value with 5% and 10% significant level.

Exports of goods and services as a percentage of GDP are included in the OLS model to test another Granger causality relation. Since Singapore, Indonesia, Malaysia, Thailand, and the Philippines have pursued export-oriented economic growth, it is important to examine how the inclusion of an export variable in the model influences the relationship between FDI and GDP.

3.2 Impulse Response Function and Variance Decomposition

Using VAR analysis, this paper examines the variance decomposition and impulse response function analysis. Variance decomposition and impulse response function provide insights into the dynamics of variables of the system, which shows “how each endogenous variable responds over time to a shock in that variable and in every other endogenous variable” (Shan, 2002, p. 887). By examining variance decomposition, we can discover the proportion of variance in sequence of time which
was cased by own shocks versus by other variables. If variance of the forecast error of GDP is explained more by variance of FDI, it implies that FDI contributes to GDP growth. Similarly, if variance of the forecast error of FDI is more explained by variance of GDP, it implies that GDP contributes to FDI inflow (Shan, 2002). The Impulse response function shows how GDP responds to shocks by FDI and vice versa. “If the impulse response function shows a stronger and longer response of GDP to a shock in FDI, then one could establish FDI causes GDP” (Shan, 2002, p. 888). This analysis of variance decomposition and the impulse response function provides another insight into the relationship between FDI and GDP and can be compared with the results of the Granger Causality test.

Impulse response functions are easy to derive from equation (4). We can calculate long-run impulse response matrix for a VAR(2) model as follows:

\[
\Phi_\infty = (I_2 - \Pi_1 - \Pi_2)^{-1}
\]

Where \(\Pi_i\) are 2 x 2 matrix defined in the equation (3). These long-run impact results are illustrated by the estimated impulse response functions for the two variables based on a VAR(2) model in Figure 1 to Figure 6 in Appendix 3.

On the other hand, we can investigate which part of the forecast error variance is caused by which variable. For the first variable, the forecast error variance equals to

\[
\sigma_1^2 (1 + \sigma_{11}^2) + \sigma_{12}^2 \sigma_2^2
\]

The first part in the above equation is due to its own variances while the second part in the above equation is due to the second variable. Expressed as percentages, we can thus examine the relative importance of the error variance of variable \(y_{1t}\).
CHAPTER IV Results

This paper finds that Granger causality hypothesis tests do not show a consistent causal relationship between inflow of FDI and GDP growth among sample countries. The results of the Granger causality test without the export variable shows that Indonesia is the only country among 5 sample countries which has a significant causal relationship from GDP growth to FDI inflows at a 5% significance level. Thus, in the case of Indonesia, we can conclude that the high growth rate of GDP attracts the high inflow of FDI. On the other hand, the Granger causality test from FDI inflow to GDP growth in Indonesia does not show a significant causal link.

However, for Singapore, Malaysia, Thailand, and the Philippines, Granger causality tests do not show a statistically significant causal relationship between FDI and GDP in any direction. These findings do not support the conventional theoretical explanation of the positive impact of FDI inflows on economic growth. However, the insignificant causal relationship discovered in this paper by Granger causality tests is consistent with the findings of Carkovic and Levine’s (2002) empirical study. Their micro and macroeconomic analysis of the causal link between FDI and GDP finds that FDI does not have any positive impact on long-run economic growth.

The Granger causality tests do not show a significant similarity in patterns of a causal link between FDI and GDP among Indonesia, Malaysia, and Thailand which belong to the second tier of NIEs. Even though these three sample countries have a
similar level of economic development which can be measured by the income level of countries, they do not show a similar causal relationship between FDI and GDP.

Since all of the sample countries had a negative economic impact from the Asian financial crisis in terms of FDI inflow and GDP growth, Granger causality tests are performed by using data up to 1997, when the Asian financial crisis occurred. By excluding the data of the post Asian financial crisis, the shocking impact of regional economic crisis can be discounted, which provides a general trend in the relationship between FDI and GDP growth. However, none of the sample countries show statistically significant difference in terms of the causal relationship between FDI and GDP growth since most countries recovered from the Asian financial crisis in a short period of time.

The Granger causality tests without an export variable in this paper do not find a consistent pattern of casual links between FDI and economic growth in Asian NIEs. The test results show considerable heterogeneity in the causal relationship between economic growth and FDI inflows across countries. In addition, different levels of development of the countries, which can be estimated using GDP per capita, do not have a significant impact on the relationship between economic growth and FDI inflows: For instance, the Granger causality test does not find that Singapore has a significantly different pattern in the causal link between GDP growth and FDI inflows compared with other sample countries which have a lower income level.

The Granger causality test with the export variable shows Indonesia and Thailand have a significant causal relationship from FDI to GDP at the 10%
significance level. As pointed out previously, the sample countries’ economic growth is based on an export promoting policy. Therefore, the Granger causality test with the export variable provides insight into how export influences on the causal links between FDI and GDP growth. Granger causality test results with the export variable are different from ones without the export variable, as can be seen in Table 1 in Appendix 1. As a result, we can conclude that FDI with export Granger causes GDP growth in Indonesia and Thailand, but FDI by itself does not Granger cause GDP growth.

Variance decomposition indicates how much the variability of GDP is explained by disturbances in FDI and vice versa. Table 1 in Appendix 2, the variance of decomposition of GDP in Indonesia, clearly indicates that most (98.4%) of the variation of GDP is explained by its own innovations even after the 20th period, while 1.53% of variation of GDP is explained by disturbance of FDI. It implies that FDI does not have a great influence on GDP movement. However, variance decomposition of FDI shows quite a different trend. In the 20th period, 68% of the variability in FDI is explained by shocks in GDP, which means that only 31.9% of variation of FDI is explained by its own shocks. Therefore, we can conclude that the variance of FDI tends to be explained by the both shocks in FDI and shocks in GDP, whereas shocks in GDP tend to be explained by its own shocks. In other words, FDI has lesser influence on changes in GDP than GDP has on changes in FDI.

As can be seen in Table 2 in Appendix 2, Thailand presents that 42.7% of variance of FDI comes from shocks in GDP, whereas only 10.1% variance of GDP
comes from shocks in FDI. Malaysia also shows that 98.8% of variability in GDP is explained by its own innovation even after 20th period. For the Philippines, 98.3% of variance in GDP is explained by its own shocks and 96.4% of variance in FDI is explained by its own shocks for the long run period (20th period). Therefore, the analysis of variance decomposition in case of the Philippines in Table 4 in Appendix 2 shows that shocks in GDP do not have great long run impact on variance of FDI and vice versa.

Table 5 in Appendix 2 presents the variance decomposition in Singapore. Even in the long run period (20th period), 96.1% of GDP variance is still due to its own changes, while 3.8% is attributed to shocks of FDI. Variance decomposition of FDI shows that 11.3% of variance of FDI is explained by shocks of GDP while 88.6% variability of FDI is explained by its own shocks.

In conclusion, for all sample countries, the variance of GDP is mostly explained by its own shocks; thus, the contribution of disturbance in FDI to the variability of GDP is trivial. However, variance of FDI comes from either mostly its own innovation in cases of the Philippines (96.4%), Singapore (88.6%), or the mixture of its own shocks and shocks of GDP in the cases of Indonesia, Thailand, and Malaysia. These results show that FDI hardly has influence on the movement of GDP in all six sample countries, whereas GDP have influence on the movement of FDI except the Philippines and Singapore.

The impulse response functions in Figure 1 to 10 in Appendix 3 illustrate the dynamic relationship between GDP and FDI. In Figure 1 illustrates the response of
GDP and FDI to one standard deviation GDP shock. Positive GDP shock has an immediate positive effect on GDP; thus, it increases GDP growth which lasts approximately for 4 periods. However, this shock hardly has any positive effect on FDI. Figure 2 shows that a positive FDI shock increases both FDI and GDP. A positive impact on GDP from a FDI shock increases for 3 periods and then starts declining while positive impact on FDI gradually declines. The positive response of GDP to a FDI shock lasts longer than the positive response of FDI to a FDI shock.

Figure 3 shows that a positive GDP shock has immediate positive impact on GDP and also creates positive impact on FDI in Thailand. Even through the positive response of FDI to a GDP shock lasts shorter than the positive response of GDP to a GDP shock, it is more significant than one in Indonesia. On the other hand, a positive shock in FDI has positive impact on FDI, but it has negative impact on GDP. This positive impact on FDI and negative impact on GDP dies out after the 9th period. Figure 4 clearly show the negative response of GDP to shock in GDP.

Figure 5, in the case of Malaysia, shows that a positive shock in GDP has almost no effect on FDI inflow while it has a great positive impact on GDP. Figure 6 indicates that positive response of FDI and GDP from a FDI shock lasts for 10 periods. Figure 7 illustrates that the response of FDI and GDP to a GDP shock in the Philippines. A positive GDP shock has a positive response of GDP in first 3.5 periods while FDI virtually has no response to this shock. Figure 8 shows the positive FDI shock has an insignificant positive response of GDP for first 2.5 periods and then this positive response becomes negative.
Figure 9 and 10 show the response of GDP and FDI to a shock in GDP and a shock in FDI in Singapore. As can be seen in Figure 9, positive response of GDP to a positive GDP shock last only for approximately 2.5 periods and a positive GDP shock creates a negative response of FDI. Figure 10 illustrates a positive response of FDI and GDP to a positive shock in FDI. This positive response is more significant compared with other sample countries. Positive response of GDP to a shock in FDI becomes negative after approximately 2.5 period, whereas positive response of FDI to a shock in FDI stays positive until it dies out.

In conclusion, we find that the response of FDI to a shock in GDP is insignificant, which implies that a GDP shock has little impact on FDI. Each country has a different pattern of the response of GDP to a shock in FDI. In particular, Thailand shows that a positive shock in FDI creates the negative response of GDP while Malaysia shows that a positive shock in FDI creates the positive response of GDP.
CHAPTER V  Conclusion

Through a comparative analysis of GDP growth and FDI inflow by using the Granger causality test with and without an export variable and variance decomposition and the impulse response function in VAR system, we can find that inconsistency in the causal link between FDI and GDP. The Granger causality test including the export variable results in different patterns of the causal link between FDI and GDP compared with the results without the export variable; therefore, FDI cannot be treated as an independent variable for GDP growth disregarding other important determinant factors that contribute to long-run economic growth.

The tests without the export variable shows that there is a statistically significant causal link from GDP to FDI in Indonesia, whereas the tests with the export variable shows that there is a statistically significant causal link from FDI to GDP in Indonesia and Thailand. In addition, analysis of variance decomposition finds that shocks in GDP tend to be explained by its own shocks, which implies FDI has little influence on variance of GDP. The impulse response functions show that the response of FDI to a shock in GDP is insignificant. From these inconsistent results, this paper supports the idea that FDI inflow cannot independently cause GDP growth.

The results of the inconsistent causal relationship between FDI and GDP growth in this study do not mirror the conventional view of FDI as a determinant factor for economic growth. FDI does not guarantee long-run positive impact on economic growth, as discovered in this paper by several econometric methods.
Therefore, it is critical to reassess government economic growth policy in some developing countries that heavily focus on attracting FDI with a belief in the myth of a strong positive causal link from FDI to economic growth. These developing countries try to provide a favorable business and investment environment for foreign investors, including tax incentives, loose environmental restrictions, deregulation of bureaucratic and legislative processes, and duty exemptions. The findings of this paper suggest that these developing countries should reconsider their economic development policy which is mainly based on the belief of a positive causal link from FDI to economic growth. FDI by itself cannot be the independent cause of long-run economic growth.
References


Carkovic, Maria and Levine, Ross (May, 2002). “Does Foreign Direct Investment Accelerate Economic Growth?” *University of Minnesota.*


Appendix 1

Table 1 Results of Granger Causality Tests

<table>
<thead>
<tr>
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<th>Granger Causality Test without Export</th>
<th>Granger Causality Test with Export</th>
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<td>Probability</td>
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<td>FDI → GDP</td>
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<td>0.44563</td>
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<td>FDI → GDP</td>
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<td>0.84993</td>
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<td>FDI → GDP</td>
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* * indicates the 10% and 5% significance level respectively.
## Appendix 2

### Table 1 Indonesia

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<th>Variance Decomposition of GDP</th>
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Ordering: GDP FDI

### Table 2 Thailand

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Ordering: GDP FDI
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Variance Decomposition of FDI

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Ordering: GDP FDI

### Table 4 Philippines

Variance Decomposition of GDP

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Variance Decomposition of FDI

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Ordering: GDP FDI
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Ordering: GDP FDI
Appendix 3

Figure 1 & 2: Indonesia Impulse Response Function

Response of GDP to One S.D. Innovations

Response of FDI to One S.D. Innovations
Figure 3 & 4: Thailand Impulse Response Function

Response of GDP to One S.D. Innovations

Response of FDI to One S.D. Innovations
Figure 5 & 6: Malaysia Impulse Response Function

Response of GDP to One S.D. Innovations

Response of FDI to One S.D. Innovations
Figure 7 & 8: Philippines Impulse Response Function

Response of GDP to One S.D. Innovations

Response of FDI to One S.D. Innovations
Figure 9 & 10: Singapore Impulse Response Function

Response of GDP to One S.D. Innovations

Response of FDI to One S.D. Innovations