

A Var Analysis of the Connection between FDI and Economic Growth: A Case Study from Vietnam after 30 Years Reforms

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Abstract: According to many studies, Foreign Direct Investment (FDI) has had a positive effect on economic growth. Thomas et al. (2008) discussed that multinational companies are more successful in developing new products and technologies than local companies, thus exerting competitive pressure on firms in some countries to compete and innovate. This has prompted developing countries to look for ways to attract FDI. The most developed economy faces the issue of investment- savings and FDI promotes growth by offsetting this gap by increasing productivity, technology transfer and increased competition (Kobrin, 2005). Given the practical benefits and expected benefits of FDI, many researches have been conducted to study the impact of FDI on economic growth. However, the results have been found mixed regarding the impact of FDI on economic growth in developed countries. In the theory of economic growth, the factor is always mentioned. When an economy wants to grow faster, it needs more capital. If domestic capital is not enough, this economy will want to have capital outside the country, including FDI. One of the purposes of FDI is to exploit conditions to achieve low production costs, foreign-invested enterprises will employ many local workers. The income of an improved part of the population will contribute positively to local economic growth. During the hiring process, vocational skills training, which in many cases is new and progressive in developing countries that attract FDI, will be provided by enterprises. This creates a skilled workforce for FDI-attracting countries. Not only regular workers but also local professionals have the opportunity to work and professional training in foreign-invested enterprises. At the same time, FDI stimulates the domestic economy to join the global production network. When attracting FDI from multinational companies, not only the multinational company's investment capital, but also other domestic enterprises that have business relationships with that enterprise will participate too, which is regional division of labour. Therefore, the host country will have the opportunity to join the entire production network which is conducive to boosting exports. FDI provides much-needed resources for developing countries such as capital, technology, management skills, entrepreneurship, branding and market access. These are essential for the industrialization and modernization of the country, to develop and create more jobs, and to contribute to poverty reduction and improve the economic situation in developing countries, such as in Vietnam. As a result, most developing countries recognize the potential value of FDI and liberalize their investment regimes. Like other developing countries, Vietnam also opens the door to FDI into the country with the expectation of great benefits. After 30 years of renovation and opening up integration, despite many difficulties, Vietnam has achieved many advancements in the process of economic growth, increasingly bringing Vietnam out to the international arena.

Keywords: FDI, GDP growth, impact, Vietnam, Capital

1. Introduction

After 30 years of renovation, Vietnam has achieved significant transformations in industrialization and modernization of the country. From a backward agricultural economy with 90% of the population working in agriculture, Vietnam has built up material and technical facilities and socio-economic infrastructure to gradually meet the cause of industrialization and modernization. The environment attracts social resources for development. The country's appearance has changed, the economy has maintained a relatively high growth rate, the potentials and scale of the economy have increased (reaching the middle - income level); the people's life has been improved. At the same time, it creates demand and motivation for all aspects of social life. Enterprises, businessmen and entrepreneurs have become an important force to implement the country's industrialization and modernization. Economic growth, over the past 30 years, Vietnam's economy has reached a higher growth rate than the pre-renovation period. After the first renewal period (1986-1990), with an average annual GDP growth rate of just 4.4%, Vietnam's economy has experienced nearly 20 years of impressive growth: the period 1991 - 1995, the average GDP growth rate was 8.2% per year, double that of the previous five years; In spite of the impact of the regional financial crisis 1997-1999, GDP continued to grow at an average annual rate of 7.6%, in the period of 2001-2005, GDP increased by 7.34% on average in the period 2006-2010, due to the global economic recession, Vietnam still recorded an average GDP growth rate of 6.32% per annum. In the coming years, due to the impact of the global financial crisis in 2008 and the debt crisis in 2010, Vietnam's GDP growth rate in the 2011-2016 period has slowed down but still reached 5.9% per year, which is the high level of the region and the world. The size of the economy has grown rapidly. In 2003, after 16 years of renovation, GDP per capita in Vietnam is only 471 USD/year. By 2015, the economy will reach about 204 billion USD, per capita income will reach nearly 2,300 USD. Production forces have improved in both quantity and quality. The quality of growth has improved, the level of production technology has been improved. The contribution of TFP (productivity growth to growth) in the period 2001-2005 reached 21.4%, in the period 2006-2010 reached 17.2%, in the period 2011-2017 reached 28.94%. Basic macroeconomic stability, inflation is controlled. Renovation efforts over the last 30 years helped to improve the investment environment, thereby attracting more and more investment capital for development. The economic structure of Vietnam is initially shifted towards modernization. FDI has grown rapidly in recent times. A country with higher FDI inflows always reflects an improved economic environment with an open economy. Most developing and underdeveloped economies all contribute to the process of direct foreign investment. There are many ideas said that FDI has had positive impacts on the Vietnamese economy such as creating jobs, increasing laborers' incomes, boosting exports, contributing to improving the balance of payments, raise the level of technology ... In the theoretically, economic growth means is bringing more profits for the investors to attract FDI; But is Vietnam really the case? It can be seen that the two-way relationship between economic growth and FDI is not only studied by many domestic scholar and foreign scholars but also by policymakers, especially, in developing countries such as Vietnam.

2. Literature Review

The literature of some research on FDI is plentiful and was originally derived from economic studies. In the theory, there is a general thought from the literature that FDI leads from economic growth (Bhavan et al., 2011, Chiwira and Kambeu 2016), and some researches are primarily based on the standards of neo-classical growth theory by Solow and Swan (1956) (Rogers, 2003). Under the neoclassical growth framework, the impact of FDI on long-term economic growth through increased production, increased capital ratios, population growth and technological progress (Rogers, 2003). Some documents indicate that important issues on FDI and its relationship with long-term economic growth in the host country, including improving GDP per capita, improving domestic investment, transferring new technologies to the host country, develop human capital, increase capital accumulation and increase exports. One more

important factor is that the benefits of FDI mainly depend on the environment in the host country, such as strategies and economic policies that will increase FDI inflows into the economy of the host country (OECD, 2000). So far, FDI in Vietnam has inclined rapidly and has become a hot topic for scholars, but the number of studies explored in this area is not much. Based on the theory of endogenous growth, the eclectic theory of domestic and foreign researchers applied the analysis of the relationship between economic growth and FDI. For example, (De Mello, 1997) studied FDI and economic growth in 32 countries (17 OECD countries and 15 non-OECD countries) in the 1970-1990 period using panel data and time series data space. The study showed that FDI has had a positive impact on economic growth in 17 OECD countries, and no impact was found in the remaining 15 countries. (Hsiao, 2006) study of eight Asian countries shows that FDI has a direct one-way effect on GDP and indirectly through exports. Depending on the specific situation in each country, each research angle, research methodology and data collected, the explanatory variables can be added, removed or replaced accordingly. For example, (Nguyen Thi Tue Anh et al, 2006) uses the Cobb-Douglas production function with OLS regression method. Given that human capital or low labor productivity limits the contribution of FDI on growth and FDI creates a positive spillover effect on small and medium-sized enterprises due to their flexibility and adaptability to the business environment in Vietnam.

Vietnam's offshore investment has received considerable attention at the International organizations such as the World Bank and ADB have been implemented in many major research institutes such as the London Institute for Strategic Studies, the Kiel International Institute for Economic Research (Germany), the World Economic and Political Research Institute of China, Vietnam ... Besides, also there are many works of famous scholars studying the investment abroad of China National as Robert Taylor, Antkiewicz, Whalley, Yevgeniya Korniyenko, Toshiaki Sakatsume, Caihua Zhu, Lina Lian, Dylan Sutherland, Jian Chen, Edward M. Graham... According to research performed by Pradeep Agrawal (2000) on the economic impact of foreign direct investment in South Asia by performing time series analysis data table from the 05 countries of South Asia: India, Pakistan, Bangladesh, Sri Lanka and Nepal, said there was an impact of foreign and domestic investment. Moreover, he explained that the impact of FDI inflows on GDP growth was negative before 1980, positive in the mid-1980s and more strongly impacted by the late 1980s in the early 1990s. Most South Asian countries followed the import-substitution policy and had high tariffs in the 1960s and 1970s. These policies gradually changed over the 1980s, and by the early 1990s, most countries had eliminated Abandoning import substitution strategies, market-oriented policies are more profitable for international trade (Pradeep Agrawal, 2000). Alejandro (1977), provides evidence that foreign capital can reduce economic growth by making excessive profits in a country, thereby distorting free trade as high taxes. In summary, empirical studies have identified capital, human resources, technology, exports, government spending, infrastructure, openness to technology, technology, and the environment impact on GDP and FDI. Therefore, the author's paper aims at the following main objectives: First, to clarify the interaction between economic growth and FDI in Vietnam through the use of the Vector Auto-Regressive (VAR) model. Secondly, based on the results from the empirical model, the authors propose important measures to improve and enhance the impact of FDI and economic growth in Vietnam.

3. Research Methodology

3.1 Selection of Variables and Explanation of Variables

Gross domestic product (GDP): GDP is the market value of all products manufactured on a territory a country over a period (usually calculated in one year). These products include the products of foreign companies and local companies including all production, service and tourism, measuring the performance of the economy in Vietnam and converted into comparative price 1994, unit of calculating million VND, source from General Statistics Office.

Foreign Direct Investment (FDI): The value of foreign direct investment inflows in Vietnam is used each year, conversion of 1994 price, unit of million VND, the source from General Statistics Office.

Trade openness as a percentage of GDP (OT): Commercial openness is calculated by subtracting the total import and export value of a period divided by the value of gross domestic product during that period: $Openness = (Export + Import) / GDP$. The main goal of economic liberalization is the flow of free capital between countries, the allocation of resources and effective competitive advantage. This is usually done by reducing protectionist policies such as tariffs, trade laws and other trade barriers. One of the major impacts of increasing this flow of capital into the country is that it makes it easy for companies to access capital from investors. The lower cost of capital allows companies to profit from their projects. All this leads to the assumption that economic openness has a positive effect on economic growth. This variable can also be considered as an attractive factor for FDI regarding productivity because it often facilitates the import of raw materials and exports of products.

Training level of labor force (TLL): Labor forces to reflect the training level of labor, measured by the number of graduate students, universities, colleges, vocational training (thousands of students). At this level, workers are equipped with basic knowledge to meet their job requirements and stimulate economic growth. Ho Thi Thanh Mai and Pham Thi Thanh Thuy (2016) reflect the level of labor, as measured by the number of college students, the research indicates that at lag $p = 1$, Human resources have the same impact on FDI at 10%, meaning that the increase in students in year t will have a positive effect on FDI after one year with the increase of 0.307%. Nguyen Thi Tue Anh and colleagues, (2006) is measured by the proportion of people working in the economy who have completed primary school, elementary education and the literacy rate. Research shows that human capital has both a negative impact and a positive impact on economic growth. Su Dinh Thanh and Nguyen Minh Tien, (2014), measured by the number of people in the working age population, have a positive effect on economic growth. Ho Dac Nghia, (2014) measured by the number of high school graduates, this didn't have a positive impact on FDI attraction, but the number of trained workers was positive after the FDI increase.

The proportion of internet users (TECH): Percentage of Internet users (%)/year, a source from Vietnam Internet Center under the Ministry of Information and Communications.

Total domestic capital (CAP): Total domestic capital, units in millions of VND, the source from General Statistics Office.

World Trade Organization (WTO): a dummy variable developed to assess the impact of WTO accession on the Vietnam economy. This variable receives a value of 0 from 1988 - 2006 and receives a value of 1 in the remaining years from 2007 to 2017.

3.2 Research of Model

To analyze the relationship between economic growth and FDI in Vietnam, the study uses qualitative and quantitative methods. The data was collected from secondary data from the GSO, WB, Statistical Yearbook...in the periods 1988-2017, data collected by year, (30 observations). The variables in the empirical model are transformed into natural logarithms for estimation. Using Excel, Eview 9 software to assist in the process of analyzing and processing data is shown through tables, illustrations. In this section, we will describe the choice of variables, models and determinants of economic efficiency in the case of Vietnam. The purpose is to analyze the relationship between FDI and GDP in Vietnam. The smallest regression analysis and the VAR model are applied to control the endogenous problem of variables in the model. The VAR model, also known as the autoregressive vector model, is a generalization of the one-

dimensional self-regression model in predicting a set of variables, a vector of time series. It estimates each equation of each string variable according to the latency of the variable (p) and all other variables.

General VAR model:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + s_t + u_t \quad (1)$$

With

$$Y_t = \begin{bmatrix} Y_{1t} \\ Y_{2t} \\ \dots \\ Y_{mt} \end{bmatrix}; u_t = \begin{bmatrix} u_{1t} \\ u_{2t} \\ \dots \\ u_{mt} \end{bmatrix}; s_t = \begin{pmatrix} s_{1t} \\ s_{2t} \\ \dots \\ s_{mt} \end{pmatrix}$$

A_i ($i= 1,2, \dots,p$) : is the square matrix $m * m$. In (1) Y_t is the set of endogenous variables; S_t is the set of exogenous variables (if any). Let L be a latency operator, the model (1) can be written as follows:

$$Y_t = (A_1 L + A_2 L^2 + \dots + A_p L^p) Y_t + s_t + u_t \quad (3)$$

The VAR model is a combination of two models: unilabiate auto regression (AR) and simultaneous systems of equations (SEs). The VAR model combining the advantages of AR is easy to estimate using minimizing residuals (OLS) and the advantage of SEs is the estimation of multiple equations in a system. In also, the VAR model can overcome the disadvantage of SEs that it does not care about the indigenoussness of economic variables. That is, macroeconomic variables are often endogenous when they interact with each other. This attribute makes the multiple regression using a regression equation much more erroneously estimated. These are the basic reasons that make VAR model popular in macroeconomics. VAR models are to consider and by Sims (1980) when he used the equations for simultaneous multi-equation econometric analysis. This model is based on time series analysis describing the variables' dynamic structure, and therefore it often examines the tendency of variables (Luetkepohi, 2011). VAR model is a statistical model to examine the interdependence between the variables in the analysis of time series, (Fabozzi, 2009) "model represents each variable as a weighted average of the values falling its own logistics plus the lag values of other variables. The VAR with p lags are represented by VAR model"(2009, page 292). According to Luetkepohi (2011), five major steps were developed and supplemented by Granger (1981), Engle and Granger (1987) and Johansen (1995) to explore causality in the autoregression model (VAR), should be applied to test any relationship between variables.

3.3 Model of Research

This model contains variables for total FDI inflows. Therefore, the specified model equation can be formulated below:

$$\mathbf{GDP} = \beta (\mathbf{FDI, TO, TLL, TECH, CAP, WTO}) \quad (4)$$

Where:

Growth is measured by GDP, FDI and some variable **OT, TLL, TECH, CAP, WTO**

$$\mathbf{Y}_t = \mathbf{M}_0 + \mathbf{M}_1 \mathbf{X}_t + \mathbf{M}_2 \mathbf{Z}_t + \boldsymbol{\varepsilon}_t \quad (5)$$

Where: - Y_t is the log of the endogenous growth theory variables measured by Gross Domestic Product (GDP).

- t stands for the current time observation of each variable depending on the ownership of the lagging values.

- M_1 denotes the intercept time of the equation.
- M_1 and M_2 are the slope coefficients of the equation.
- X_t is the independent variable of the equation representing the Foreign Direct Investment Flow (FDI).
- Z_t is the independent variable including **OT, TLL, TECH, CAP, WTO**
- ε_t is the term for error correction of the model. WTO is dummy variable. Based on the theory, the literature review and the contributions by (Dunning, 1981), (De Mello, 1997), Research proposed an experimental analytical model relationship between economic growth and FDI at Vietnam with time series data collected at Vietnam in the period 1988-2017, we have model Var:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \dots + \alpha_p Y_{t-p} + \beta_1 X_{t-1} + \dots + \beta_p X_{t-p} + \varepsilon_{yt} \quad (6)$$

Where: t is the time, X_t , Y_t are time series space, α_0 is the free terms coefficients; α_p , β_p are endogenous variables coefficients and ε are residual errors.

ε_{yt} the random error value, p is lag variable. The main steps of the econometric analysis are:

- a) Administering of stationary tests
- b) VAR model selection and the appropriate lag
- c) Checking the stability of the model
- d) Identification of respond and impulse functions

We have some Conditions to be fulfilled so that a time series be stationary is :

Average time series to be stable, or in other words, remarks must fluctuate around the average. The author used data from 1987-2017. The series variance to be stable. From an economic perspective, a series is stationary if shock applied on it is temporary (absorbed in time) and not constantly. If a series is not stationary, by differentiating one obtains a stationary series. The integration order of the series is the number of successive differentiations required to achieve a stationary series. Therefore, we have proceeded to the differentiation of order 1 of the series, and the results indicate that these integrated series are stationary of $I(1)$ and $I(0)$.

Next, the author wants clear the selection criterion of the lag and the VAR model construction. Regarding the construction of the model, we used the series on a level, even if the VAR methodology suggests that all variables should be stationary. The argument is as follows: "The traditional approach of VAR enthusiasts is to work on the level, even if some of the series are non-stationary. In this case, it is important to recognize the effect of the unit root over the estimator distribution." (Harvey, 1990, p. 83). Consequently, the VAR model can be considered representative to describe autoregressive connections between FDI and economic growth of Vietnam. Based on the model, we can have result of impulse responses, which evaluates the effect of a shock on variations in current or future values of those variables in the model.

4. Data Analysis and Interpretation

To assess the impact of FDI on economic growth, the authors selected the VAR model, which as proposed in Jordan by Shan (2002) and Haitao Sun (2011). The factors and values selected for the VAR model are as follows: GDP - Gross Domestic Product of 1994 (VND billion); FDI - Value of disbursed FDI (million USD); OT - trade openness; TLL- Number of people in the labor force aged 15 and older (thousand persons); TECH -Internet percentage (%), CAP Total investment capital of the whole society (billion VND); and use the WTO dummy variable with a value of 1 from 2007 to 2017 and 0 from 1988 to 2006. Data sequences are collected quarterly from the General Statistics Office, the State Bank of Vietnam, the Vietnam Internet Center under the Ministry of Information and

Communications, and are logically calculated on a natural basis. A total of 30 observations and abstracts of data series are presented in Tables 1 and 2.

Table 1: Statistics describing the variables in the model

	GDP	FDI	OT	TLL	TECH	CAP	WTO
Mean	72.7149	8.073367	1.135667	1254671	18.309	464551.1	0.4
Median	40.33	3.1095	1.0935	1114283	4.155	219695.5	0
Maximum	220	36	1.92	2208062	80.21	1542313	1
Minimum	2.542	0.212	0.519	289817	0.54	21309	0
Std. Dev.	68.41802	9.137368	0.458995	685876.1	21.29767	490606.3	0.498273
Skewness	0.87348	1.345286	0.193316	0.128954	1.316131	0.948436	0.408248
Kurtosis	2.350519	4.05092	1.691373	1.379265	3.918197	2.508905	1.166667
Jarque-Bera	4.34212	10.42951	2.327485	3.366624	9.714862	4.799124	5.034722
Probability	0.114057	0.005436	0.312315	0.185758	0.00777	0.090758	0.080672
Sum	2181.447	242.201	34.07	37640136	549.27	13936533	12
Sum Sq. Dev.	135749.8	2421.253	6.109625	1.36E+13	13154.13	6.98E+12	7.2
Observations	30	30	30	30	30	30	30

Source: Author's computation using Eviews 9 econometric soft ware

Table 2: Statistics describing the variables in the model (logarithm variable)

	LNGDP	LNFDI	LNOT	LNTLL	LNTECH	LNCAP	WTO
Mean	3.735262	1.315567	0.041328	13.8667	2.139907	12.3325	0.4
Median	3.695337	1.13446	0.08814	13.90642	1.424294	12.29602	0
Maximum	5.393628	3.583519	0.652325	14.60763	4.384648	14.24879	1
Minimum	0.932951	-1.55117	-0.65585	12.577	-0.61619	9.966885	0
Std. Dev.	1.190448	1.441561	0.431413	0.635559	1.340969	1.342221	0.498273
Skewness	-0.40969	-0.4091	-0.19102	-0.33674	0.068762	-0.13057	0.408248
Kurtosis	2.387586	2.345249	1.641764	1.830721	1.883215	1.768379	1.166667
Jarque-Bera	1.308034	1.37268	2.488453	2.276	1.582651	1.981347	5.034722
Probability	0.519953	0.503415	0.288164	0.320459	0.453244	0.371326	0.080672
Sum	112.0579	39.46701	1.239841	416.0011	64.19722	369.9751	12
Sum Sq. Dev.	41.09785	60.26486	5.397395	11.71411	52.14772	52.24517	7.2
Observations	30	30	30	30	30	30	30

Source: Author's computation using Eviews 9 econometric software

Based on the estimation results in Table 3, all variables used in the model have a linear correlation, with R^2 almost all greater than 90%. This can be concluded that the VAR model may be suitable for estimating, predicting, and considering the interplay of variables through shocks. Correlation of logarithmic variables is more closely related, so the author has logarithm of variables for using the VAR model.

Table 3: Linear correlation coefficient between the logarithm variables

		LNGDP	LNFDI	LNCAP	LNTLL	LNTECH	LNTE	LNOT
LNGDP	R	1	0.876	0.687	0.832	0.967	0.921	0.864
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000
LNFDI	R	0.881	1	0.892	0.912	0.931	0.876	0.865
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000	0.000
LNCAP	R	0.987	0.875	1	0.894	0.876	0.967	0.986
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000	0.000
LNTLL	R	0.823	0.981	0.923	1	0.872	0.921	0.891
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000	0.000
LNTECH	R	0.932	0.891	0.842	0.915	1	0.894	0.834
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000	0.000
LNTE	R	0.892	0.912	0.914	0.821	0.932	1	0.951
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000		0.000
LNOT	R	0.797	0.853	0.865	0.864	0.897	0.867	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	
** Correlation is significant at the 0.01 level (2.tailed)								

Source: Author's computation using Eviews 9 econometric software

Table 4: DF-GLS Unit Root test

Variable	DF-GLS at level	[prob.]	DF-GLS at first level	[prob.]
lnGDP	-2.939545	0.0535	-11.20434***	0.0000
lnFDI	-1.298271	0.6166	-4.549334***	0.0012
lnOT	-0.747585	0.8188	-4.769347***	0.0007
lnTLL	-2.450028	0.1377	-4.759702***	0.0007
lnTECH	-0.099119***	0.0002	----	----
lnCAP	-2.440213**	0.0201	-----	----
WTO	-0.776166**	0.0109	-----	----
D(lnGDP)	-0.232086	0.9199	-26.86426***	0.0000
D(lnFDI)	1.118911	0.9961	-24.31936***	0.0000
D(lnOT)	-0.885268	0.7713	-48.38937***	0.0000
D(lnTLL)	2.192859	0.9998	-3.071704	0.0061
D(lnTECH)	0.583731***	0.0055	-----	-----
D(lnCAP)	1.711532**	0.0312	-----	-----

Source: Source: Author's computation using EViews 9 econometric software

One of the requirements of VAR model is to test stationary of the data series. Prior to introducing the variables into the model, the author conducted a Unit Root Test of the data series using the DF-GLS unit Root test. We have results show that the LNTECH and DLNCAP stationary at level and variables LNFDI, LNGDP, LNOT, LNTLL non-stationary at level but became stationary at first difference.

After estimating the VAR model, we need to consider the stability of the model to have a basis for concluding the model is appropriate. Stability tests show that the solutions of the characteristic polynomials are less than 1 and are in unit circle. Different latencies, p value of Q statistic is greater than 5%, which accepts the Ho- No autocorrelation hypothesis, and the model is considered to satisfy the autocorrelation condition of the residual. Determination of the uniformity of variance was carried out by White's variation in the variance of the variable, indicating that the null hypothesis was accepted, or the model had a uniform variance. The above results show that the VAR model to assess the impact of FDI and economic growth in Vietnam is consistent and stable.

Inverse Roots of AR Characteristic Polynomial

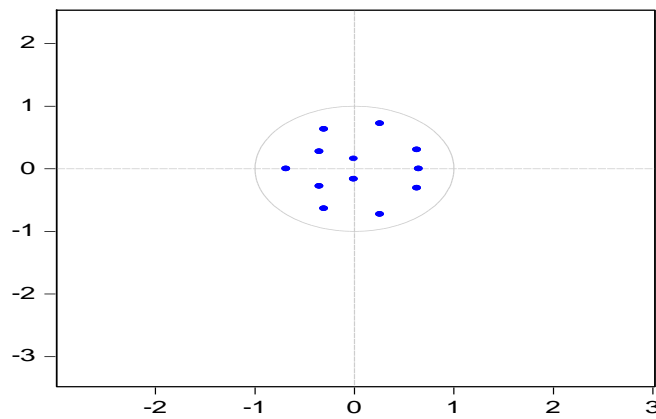


Figure 1: Test the stability of the model

Source: Author’s computation using EViews 9 econometric software

Optimal lag: when we are considering the effect on other variables, usually the economic variables have different latencies. Right at the time of investing, the economic variables do not immediately impact, so there is a certain lag. With 5 standard LR, FPE, AIC, SC, HQ for choice, and we have lag optimal in model is 2.

Table 5: Optimal lag in VAR model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	127.810	NA	4.86e-12	-9.02297	-8.735015*	-8.937352
1	181.804	79.9914*	1.38e-12	-10.3558	-8.340139	-9.756498
2	224.238	44.0053*	1.34e-1*	-10.8324*	-7.088929	-9.719311

Source: Author’s computation using EViews 9 econometric soft ware

Table 6: Estimation results of VAR model

	D(LNGD)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
DLNGDP(-1)	0.062048	0.544278	0.044397	0.1119	-0.211471	0.111708
	-0.20256	-1.06169	-0.25358	-0.45855	-0.54864	-0.17164
	[0.30632]	[0.51265]	[0.17508]	[0.24403]	[-0.38545]	[0.65085]
DLNGDP(-2)	0.098267	0.673144	-0.292062	-0.257794	-0.93232	0.032245
	-0.12391	-0.64945	-0.15512	-0.2805	-0.33561	-0.10499
	[0.79307]	[1.03649]	[-1.88285]	[-0.91905]	[-2.77802]	[0.30712]
DLNFDI(-1)	0.08808	-0.185281	0.027536	-0.070545	0.048066	0.003792
	-0.04434	-0.23239	-0.0555	-0.10037	-0.12009	-0.03757
	[1.98660]	[-0.7973]	[0.49610]	[-0.70285]	[0.40025]	[0.10093]
DLNFDI(-2)	0.066482	-0.080635	0.029009	0.037842	0.059599	-0.003948
	-0.04791	-0.2511	-0.05997	-0.10845	-0.12976	-0.04059
	[1.38771]	[-0.3211]	[0.48368]	[0.34892]	[0.45931]	[-0.09725]
DLNOT(-1)	-0.432501	0.266502	0.022931	0.161612	-1.051136	0.445545
	-0.33125	-1.73618	-0.41468	-0.74987	-0.89718	-0.28067
	[-1.30568]	[0.15350]	[0.05530]	[0.21552]	[-1.17159]	[1.58741]
DLNOT(-2)	-0.430832	-2.107372	-0.151691	-0.366556	-0.074581	0.104227

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	-0.13786	-0.72258	-0.17259	-0.31209	-0.3734	-0.11681
	[- 3.12510]	[- 2.9164]	[-0.87894]	[- 1.17452]	[-0.19973]	[0.89225]
DLNTLL(-1)	0.220923	- 0.29668 1	0.037227	0.055586	0.846827	0.134212
	-0.14017	-0.73467	-0.17547	-0.31731	-0.37964	-0.11877
	[1.57614]	[- 0.4038]	[0.21216]	[0.17518]	[2.23058]	[1.13004]
DLNTLL(-2)	-0.050994	0.69885 3	-0.028571	-0.110427	-0.420989	0.243287
	-0.1716	-0.89943	-0.21482	-0.38847	-0.46479	-0.1454
	[- 0.29716]	[0.77700]	[-0.13300]	[- 0.28426]	[-0.90577]	[1.67319]
DLNTECH(-1)	0.262557	- 0.25618 5	-0.021942	0.106322	0.71369	-0.078819
	-0.11027	-0.57795	-0.13804	-0.24962	-0.29866	-0.09343
	[2.38110]	[- 0.4432]	[-0.15895]	[0.42593]	[2.38964]	[- 0.84359]
DLNTECH(-2)	-0.115731	0.61342 1	-0.099416	-0.124476	-0.446883	0.13985
	-0.10485	-0.54954	-0.13126	-0.23735	-0.28398	-0.08884
	[- 1.10381]	[1.11624]	[-0.75742]	[- 0.52444]	[-1.57364]	[1.57418]
DLNCAP(-1)	0.535602	- 1.73747 7	-0.166981	1.023003	2.109214	-0.259136
	-0.33163	-1.73818	-0.41516	-0.75073	-0.89822	-0.281
	[1.61507]	[0.99960]	[-0.40221]	[1.36267]	[2.34822]	[- 0.92220]
DLNCAP(-2)	-0.705537	0.62414 4	-0.159402	0.191045	-1.421737	0.298447
	-0.38927	-2.04029	-0.48731	-0.88122	-1.05433	-0.32984

	[-1.81247]	[0.30591]	[-0.32710]	[0.21680]	[-1.34847]	[0.90483]
C	0.114468	0.200953	0.140747	-0.087367	0.172745	0.057869
	-0.05135	-0.26912	-0.06428	-0.11623	-0.13907	-0.04351
	[2.22938]	[0.74671]	[2.18968]	[-0.75165]	[1.24215]	[1.33013]
WTO	0.452132	0.329212	0.672322	0.512129	0.562123	0.251671
	0.001422	0.00214	0.32112	0.23123	0.219231	0.214321
	[3.215243]	[3.12781]	[-4.21315]	[-3.34132]	[-4.21341]	[-3.34123]

Source: Author's computation using EViews 9 econometric software

From the results of the impact analysis of the reaction function, we have some comments as follows:

FDI response to the shocks of economic growth indicators:

According to the results, the linear correlation coefficients of the variables of the variables (Table 8) over time are favorable. The response function only indicates whether the rate of increase is higher or lower. Based on Table 8, we find that FDI responds immediately and only to the shock from GDP (positive reaction in the first period) and other variables also respond from FDI but the late respond.

Based on the results, we see that the increase of GDP will affect the direction of FDI growth from the first year to second years, then the rhythm increases gradually. In particular, a 1% increase in GDP can bring the effect 0.146% of FDI growth in the first year and an increase of 0.036% in the second year. However, in the third year, it tends to weaken, even bring value sound. In the third year, 1% increase in GDP reduced -0.04% FDI, but in the fourth year, there are signs of recovery but very slowly with small absolute value. This shows that FDI is tending to favor short-term efficiency.

Table 7: Analyzing the impact of the response function

Response of D(LNGDP)						
Period	D(LNGDP)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
1	0.053129	0	0	0	0	0
2	0.006639	0.026347	0.000268	0.007436	0.021986	0.018993
3	0.001282	0.001614	-0.012890	0.019541	0.08714	0.03976
4	0.006792	0.003910	-0.004768	0.004302	0.009404	0.013274
5	0.005335	0.003517	0.002993	0.007486	0.001637	-0.009113
Response of D(LNFDI)						

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	D(LNGDP)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
1	0.146245	0.274603	0	0	0	0
2	0.036728	0.055516	0.008086	0.015871	0.013120	-0.06161
3	-0.04843	-0.009194	-0.007904	0.001185	0.022203	0.02835
4	0.007405	0.008897	0.008667	-0.007101	0.025431	0.060149
5	0.004137	-0.002334	0.005019	-0.036725	0.026182	0.006451
Response of D(LNOT)						
1	0.031466	0.012716	0.057201	0	0	0
2	0.002215	-0.005191	0.000853	0.00492	0.000327	-0.00592
3	-0.024126	-0.000908	0.019617	-0.00124	-0.00855	-0.0054
4	-0.010963	0.010956	-0.017604	-0.011908	-0.01025	-0.01465
5	0.00237	0.000657	0.004724	-0.013946	0.002006	-0.00102
Response of D(LNTLL)						
1	0.019443	0.030794	0.055379	0.100362	0	0
2	0.026471	0.011148	0.027075	-7.38E-05	-0.00537	0.036277
3	0.000996	0.009978	0.007471	0.021891	-0.01594	0.012858
4	0.008716	0.008305	0.027432	0.012972	-0.0089	-0.00985
5	0.008540	0.003017	0.00498	0.001079	0.00282	0.009022
Response of D(LNTECH)						
1	-0.003111	0.039963	0.024406	-0.056925	0.119856	0
2	0.009171	0.004711	0.029255	0.045187	0.048196	0.074795
3	-0.017076	0.014404	0.044999	0.044973	-0.01378	0.013548
4	-0.006515	0.083677	0.03383	0.017981	-0.02278	-0.00454
5	0.004746	0.090608	0.022618	-0.005498	-0.02354	0.007219
Response of D(LNCAP)						
1	0.017549	0.022511	0.011884	0.000391	-0.01771	0.035461
2	0.018437	0.042015	0.027915	0.017855	-0.00486	-0.00919
3	0.014098	0.063398	0.020793	0.011337	0.010819	0.011188
4	0.000447	0.092497	0.000659	0.010536	-0.00169	0.011799
5	-0.004313	0.013571	0.004846	0.00829	-0.00589	-0.00128

Source: Author's computation using Reviews 9 econometric software

Openness Trade (OT) has a positive impact on FDI and responds and tends to increase. It shows that trade openness has a positive impact on attracting FDI in Vietnam. Specifically, 1% increase in OT can increase 0.008% FDI in the second year, and tend to increase but not significantly in the next years, even negative in the third year.

Training level of the labor force (TLL) has been impacted positively to FDI on 2 years, but has had an adverse effect on the increase of FDI inflows in subsequent years. This proves that the economy is still affected by low productivity areas or lack of qualified and skilled technicians in Vietnam. In the result, it creates more jobs with no obviousness to attract FDI in the long term. This result is also reflected in the response to the increase in FDI as the rhythm grows the number of trained workers. The results from the VAR model show that in the short run, when the increase in TLL, it may stimulate FDI's growth in the next year. Foreign investors have no long-term expectations with skilled labor force in Vietnam.

The proportion of internet users (TECH): has the same way effect on FDI. The respond values are positive so indicating that technology affects the GDP growth rate, but the effect is quite low. Specifically, 1% increase in TECH do increase 0.013% in second year and 0.022% on the third year, and 0.026% on the fifth year.

The increase in domestic capital (CAP): accumulation stimulated the growth FDI in the second year, but in the following years there was a reverse effect. Thus, domestic capital has characteristics of competition, although this sign is very small. In the long term, domestic capital accumulation signs reducing FDI source. The impact of FDI on economic growth indicators, based on the results of the analysis, it is found that the effect of the increase in FDI (also known as a shock) is that it affects the socio-economic indicators of the second period, except for the increase in GDP. A year's FDI shock will:

The impact on the GDP growth rate from the second year, although the coefficients are positive but very small. This shows that the appropriateness of FDI attraction in Vietnam is economic growth, but the results are not satisfactory yet. This indicates that the attractiveness of FDI in Vietnam is not as expected.

A shock of FDI created a stimulus for openness trade in the first period. The coefficients are negative for the second and third periods, but they are positive for fourth and fifth periods. The goal of foreign investors, when they have just invested the first thing they want, is to dominate the market and compete with local firms. In the medium and long term, they want to make the most of cheap labor and resources or build branches to produce goods for exportation to other countries, the FDI shock makes the coefficient of open trade to have positive value from the fourth period, but tends to decrease.

Training level of labor force (TLL): FDI has a positive impact on skilled labor in Vietnam. We saw with shock from FDI, the impact of FDI on skilled labor with the coefficients are positive values, but this effect is small. This also points to the fact that qualified workforce hasn't attracted FDI. Skilled workers in Vietnam don't meet requirements from foreign firms.

The proportion of internet users (TECH): The first is the spillover effect of FDI on economic growth, and from economic growth to the technological level of the Vietnamese people. Accordingly, high economic growth will help increase revenues. The people's life is raised in both quantity and quality. By virtue of that, people have the opportunity and ability to receive, using modern technology.

On the other hand, the application of modern technology in the chain of FDI enterprises in Vietnam, especially, enterprises operating in high technology fields, such as information technology, electronics, telecommunication, automation, etc., also promote the diffusion effect of technology and improve the

technological level of Vietnam. In spite of the fact that FDI enterprises in Vietnam are only assembled mainly, the spillover effect on the technological level of the labor force in particular and the Vietnamese people in general is difficult to deny. This is evidenced by the shock of FDI impacting the TECH sector which has a positive and incremental value over time.

The increase in domestic capital (CAP): The model results show that FDI has a positive impact on CAP. Indeed, FDI not only directly increases total investment, but also stimulates the domestic sector to contribute more to the overall capital. This conclusion is in line with the findings of Mitra (2007), Takagi and Pham (2011), Anh and Thu (2012). This shows that FDI inflows into Vietnam not only increase the total capital but also help orient the investment sector to Vietnam. In that sense, the increase of FDI in any sector will have the effect of boosting domestic investment in those sectors. Therefore, FDI not only directly increases, but also increases domestic investment capital, thus boosting the total capital for Vietnam's economic growth.

Table 8: Analyzing variance decomposition function

Variance Decomposition of D(LNGDP)							
Period	S.E.	D(LNGDP)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
1	0.003129	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.006787	95.27139	0.56293	0.001613	1.239522	1.83720	1.087345
3	0.001445	91.19497	2.65054	0.256221	1.563947	1.95760	2.376722
4	0.003971	88.26592	4.01372	0.453187	2.327276	2.83837	2.101527
5	0.005255	87.96669	3.79197	0.494547	1.035226	3.48526	3.226307
Variance Decomposition of D(LNFDI)							
	S.E.	D(LNGDP)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
1	0.178469	42.757859	57.24214	0.000000	0.000000	0.000000	0.000000
2	0.092420	37.553935	56.78957	0.922513	0.294584	3.82006	4.439398
3	0.128419	34.199338	42.84802	13.61977	0.234844	4.833371	4.264656
4	0.035206	34.300620	39.99859	13.26532	0.270307	4.851569	7.313597
5	0.045448	35.483565	35.91393	15.50900	1.384706	4.787578	6.921222
Variance Decomposition of D(LNOT)							
	S.E.	D(LNGDP)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
1							
2	0.066511	22.38208	3.654983	53.96294	0.000000	0.000000	20.000000
3	0.067199	22.03497	4.177294	52.47288	0.536045	0.002362	20.776445
4	0.074748	28.22694	3.390897	45.46080	0.460771	1.311580	21.149014
5	0.081234	25.72100	4.690114	40.12159	2.538912	2.703086	24.225305

	0.082624	24.94459	4.539860	38.44127	5.302925	2.671791	24.099562
Variance Decomposition of of D(LNTLL)							
	S.E.	D(LNGDP)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
1	0.120273	69.63059	21.20083	2.613230	6.555346	0.000000	0.000000
2	0.131789	57.99301	21.87799	6.210858	6.175251	0.165982	7.576908
3	0.135733	57.27348	20.92827	5.860612	6.362053	1.535191	8.040394
4	0.140233	54.51209	23.43326	5.876764	6.311001	1.841339	8.025544
5	0.140935	53.97635	23.32530	6.185517	6.294112	1.863091	8.355633
Variance Decomposition of D(LNTECH)							
	S.E.	D(LNGDP)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
1	0.143901	0.046746	12.05496	2.876571	15.64849	69.37324	0.000000
2	0.178390	0.294745	8.524253	4.561242	16.59901	52.44143	17.57932
3	0.191684	1.048853	7.947552	9.461445	19.88098	45.93614	15.72503
4	0.198376	1.087138	8.844889	11.74211	19.38386	44.20768	14.73432
5	0.201584	1.108241	8.842520	12.63030	18.84618	44.17544	14.39732
Variance Decomposition of D(LNCAP)							
	S.E.	D(LNGDP)	D(LNFDI)	D(LNOT)	D(LNTLL)	D(LNTECH)	D(LNCAP)
1	0.045018	15.19656	0.311056	6.968580	0.007538	15.46802	62.04826
2	0.059805	18.11443	0.289771	25.73500	8.917845	9.424505	37.51845
3	0.067750	18.44530	0.477385	29.47223	9.748895	9.894036	31.96215
4	0.069642	17.46077	0.580399	27.90150	11.51513	9.422910	33.11930
5	0.070781	17.27483	0.816265	0.070781	12.51950	9.814633	32.09500
Cholesky Ordering: D(LNGDP) D(LNFDI) D(LNOPEN_TRADE) D(LNTLL) D(LNTECH) D(LNCAP)							

Source: A1thor's computation using EViews 9 econometric software

Unstable GDP growth is mainly due to the internal volatility of this variable (The fluctuations of other variables such as FDI, OT, TLL, TECH, CAP have a very small impact on the uncertainty of GDP growth (Variance Decomposition of DLNGDP). Thus, the instability of GDP depends primarily on the dynamics of the variable itself.

The growth of fluctuating FDI due to this process generates is 35% -57%. Other factors affect is 43% - 65%. In particular, GDP causes variation in this process by about 35%-42% (Variance Decomposition

of DLNFDI). The other factors contribute insignificantly to the fluctuation of FDI. The fluctuation of OT is the main impact of GDP (around 22-24%), the fluctuation of the OT is (around 38-53%) and CAP (around 20% -24%). While FDI has only an impact less than 5%, other factors have a negligible effect. We can see that the production is geared toward exports and the integration-oriented economy is made under the positive influence of CAP and GDP growth.

TTL fluctuations affected by some factors such as FDI, GDP, CAP, special with 53%-69% with FDI and 21%-23% with GDP. While the OT and TECH factors are insignificant. Fluctuations of the TECH factor are influenced by factors such as FDI, TLL, CAP. And the fluctuation of TECH by itself is 44%-70%. While the remaining factors are insignificant with GDP and OT. Fluctuations of the CAP factor are influenced by factors such as GDP, OT, TECH. And the fluctuation of CAP by itself is 32%-62%. While the remaining factors are insignificant.

5. Conclusion and Recommendations

The results show that FDI has a positive effect on all variables present in the model. In particular, FDI has impact economic growth (GDP). However, there are also variables that have not shown positive effects of FDI, such as TLL and TECH, OT. It can be seen that in order to improve the positive impact of FDI on growth, it is important to improve the positive impact of FDI on factors such as total investment, technology, quality of human resources, export is very important. Through the VAR model, it can be seen that FDI and Vietnam's economic growth have a reciprocal relationship. Accordingly, increased FDI inflows will boost economic growth, and feedback, GDP is one of the factors that makes foreign investors transfer capital into Vietnam under the form is FDI. However, the FDI inflows also caused some not completely positive impacts on the economy. FDI only impacts Vietnam's economic growth on a broad scale, rather than in-depth. With Viet Nam's current growth model based mainly on labor and capital, FDI has been holding an important position to promote economic growth in the country. However, research has shown that the impact of FDI on Vietnam's technology is still low, which has not promoted economic growth in Vietnam.

In order to improve the impact of FDI on economic growth, Vietnam needs to improve the current macroeconomic instability, which is characterized by high inflation, bad debts and the direction of output of some products. Not particularly stable, especially agricultural commodities that affect economic growth in Vietnam. At the same time, Vietnam continues to improve its investment condition to attract capital from foreign investors to increase its total capital and support to encourage foreign investors to invest in hi-tech industries such as information technology, electronics and telecommunication. At the same time, Vietnam also takes specific measures to improve the production capacity export of Vietnam. It is about upgrading the technology level in the country and increasing the contribution of the FDI sector to GDP. At the same time, Vietnam needs attention to investment, focus education and training, Vietnam has to clear direction of spearheading knowledge in hi-tech industries, apply business skills, such as finance and banking, hotel management and tourism, both to attract FDI into Vietnam and to accelerate the process of recruiting these knowledge workers in the FDI sector. Thereby promoting the training of local labor of Vietnamese enterprises, as well as the effect of diffusing the quality of human resources for FDI sector. The state needs to strengthen inspection activities, inspection of FDI enterprises in tax, labor and environmental to limit the negative impact of FDI capital brings local. The objective of foreign investors is profit, so it is necessary to take synchronized measures to effectively promote the positive aspects of FDI inflows.

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