

Economic Growth and FDI Relationship: VECM Analysis

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Abstract

This research study was conducted to investigate and explore the correlation of FDI and economic growth in America. This study makes use of secondary data from the World Bank covering the years 1999 through 2019. The analytical method used is quantitative by modeling the Vector Error Correction Model (VECM) using the variables FDI net inflow, FDI net outflow, and GDP in America. A significant positive relationship can be seen from the GDP which affects the FDI net inflow. So this positive trend implies that increased economic growth will increase FDI flows. However, in particular there is a negative influences GDP and FDI net outflow. Besides that, the causality relationship only occurs in the FNI variable that affects GDP. While the other variables do not experience a causal relationship.

Keyword : FDI Net Inflow, FDI Net Outflow, Economic Growth, VECM.

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Background

FDI is an important section of support and assist economic growth. Based on the study findings (Akisik, Gal,& Mangaliso, 2020), FDI can encourage IFRS in Anglophone (English-speaking) and Francophone (French-speaking) countries, even though the correlation of IFRS and economic growth in the two countries is different, FDI remains a positive factor and influence on economic growth. To increase FDI inflows as well as the desired economic growth, it is necessary to have policies that support both. Several policies that can be implemented include maintaining and improving institutional quality, controlling corruption, granting rights to citizens to express themselves, and the state can cooperate with foreign companies to provide a safe business industry environment so that investments can be made optimally (Raza, Shah, & Arif, 2019).

FDI has a beneficial impact on environmental quality. This implies that a rise in FDI inflows is likely will be in line with improving environmental quality through reduced carbon emissions. These results can be concluded that the country is starting to change energy use towards a renewable energy mix. There is a need for positive policies that support the implementation of FDI inflows towards clean industries and the development of quality human resources (Halliru, Loganathan, & Hassan, 2020). These results are also in line with (Dogan, Balsalobre-Lorente, & Nasir, 2020) those indicating that FDI has a positive influence on growth of economic which is also accompanied by complexity of the economy, use of renewable energy, trade openness, and institutional quality.

FDI will greatly influence GDP by increasing investment in the development of the tourism sector (Adedoyin, Bekun, Driha, & Lorente, 2020). Furthermore, foreign direct investment

considerably impacts the economy growth of BRI countries (Zaman, Pinglu, Hussain, Ullah, & Qian, 2021).

The country's economic growth can be cultivated by maximizing FDI and HDI. Thus, it can be seen that FDI has a beneficial impact on a country's GDP and there is a need for supporting policies to maximize FDI (Srivastava & Talwar, 2020). However, economic expansion also has a major short- and long-term impact on greenhouse gas emissions. FDI does not have a significant role in the short term, but has the opposite effect in the long term (Kim Suyi, 2020).

There is a short-term one-way causality FDI linkages and economic expansion towards growth. In addition, there is also a two-way feedback the correlation of FDI and economic expansion in the long run (Gherghina, Simionescu, & Hudea, 2019). In terms of causality, FDI has a two-way relationship with GDP per capita. In addition, there is also a causal connection between FDI and private credit. This indicates how FDI affects financial sector development and economic growth. (Ibrahim & Acquah, 2020).

This is also supported in research results (Rakhmatillo, Anvar, & Sukhrob, 2021), FDI has a major role and contribution to economic growth in Uzbekistan. FDI also has a positive influence because it has a positive effect on increasing employment. This is because Uzbekistan's cheap and large workforce makes incentives for FDI. (Latief, Kong, Javied, & Sattar) found that a causal linkages of FDI and unidirectional economic growth occurred in Bangladesh, India, Pakistan, and Sri Lanka. Interestingly, in the case of Nepal there is no mutual correlation FDI and growth of economic.

The findings are different, in Africa FDI has a less strong role in stimulating economic growth. This is due to the weak development of the domestic financial sector through private credit allocation. In addition, factors affecting economic growth are the low quality of human resources, rising inflation, and the lack of infrastructure support (Acquah & Ibrahim, 2019).

On the other hand, Vietnam experienced significant economic growth due to the flow of FDI as an important factor to support economic growth obtained from developed countries. However, another problem arose because this growth was in line with the declining quality of Vietnam's environment (Vo & Ho, 2021).

FDI is not significantly impacted on economic growth in India. This is influenced because FDI causes a decrease in environmental quality or environmental degradation through CO2 emissions and energy consumption. In addition, bridging the market as a form of facilitating free trade in India, which is influenced by FDI, actually brings losses to India (Rana & Sharma, 2020). There are differences from some of the studies above, so the purpose of this study is to investigate and explore the economic growth and FDI relationship in America.

Research Method

This study will look for a causal correlation FDI and economic growth using secondary data from the World Bank website. The data used is the range of 1999-2019 with a data focus on America. The variables used are FDI net inflows and FDI net outflows as variables that represent FDI, as well as the GDP variable for economic growth. The method used to analyze is VAR/VECM with the following systematic equations:

$$GDP_t = \beta_0 + \beta_1 FNI_{t1} + \beta_2 FNO_{t2} + e_t$$

$$FNI_t = \beta_0 + \beta_1 GDP_{t1} + \beta_2 FNO_{t2} + e_t$$

$$FNO_t = \beta_0 + \beta_1 FNI_{t1} + \beta_2 GDP_{t2} + e_t$$

Information:

GDP = Economic Growth (in percent)

FNI = FDI Net Inflows
 FNO = FDI Net Outflows
 β = Konstanta
 e = Error term
 t = Time Period

The following is a variable description of the variables that will be presented in table 1.

Table 1. Description Variables

Variabel	Deskripsi	Sumber	Unit Analisis
GDP	The GDP's yearly growth rate in constant local currency at market prices. Based on an aggregate of fixed 2015 USD pricing. GDP is calculated as the total of all manufacturers' gross value added, product taxes, and subsidies that aren't factored into the cost of goods.	World Bank	Percent
FNI	According to the balance of payments, FDI is the net inflow of investments, which comprises reinvesting income, other long-term capital, total equity capital and short-term capital. This series displays the net inflows of foreign capital (new investment plus outflows), expressed as a percentage of GDP, into the reporting economy.	World Bank	Percent
FNO	Element of cross-border investment that takes place when people from one economy have a considerable amount of control or influence over the management of firms based in another. The net investment outflow from the reporting economy is displayed in this data and is divided by GDP.	World Bank	Percent

Result and Discussion

The stationary test is required first before heading to the VECM model or causality test. Through the unit root, a stationary test is needed to find out whether the series used is possibly not

stationary. Stationary test via Augmented Dickey-Fuller (ADF), table 2 with the following results:

Table 2. Stationery Test on GDP, FNI, and FNO data

Variabel	Unit Root	Statistics for the ADF Test	Probability	Description
GDP	Level	-3.405647	0.0232	Stationer
FNI	Level	-3.293955	0.0291	Stationer
FNO	Level	-3.250087	0.0318	Stationer

Table 2 describes the unit root test of GDP, FNI, and FNO with the results of all stationary variables at levels with a probability value of less than 0.05.

Table 3. Optimum Lag Test

Lag	LogL.	LR	FPE	AIC	SC	HQ
0	-80.95245	NA	1.382316	8.837100	8.986222*	8.862337
1	-68.83529	19.13235*	1.014627*	8.508978*	9.105466	8.609928*

Table 3 displays the outcomes of the Optimum Lag test. Considering the above table, determining the optimum lag can be measured by the number of asterisks in the results of LR, FPE, AIC, SC, and HQ at lag 0 to 1. So it can be concluded that the variable lengths of GDP, FNI, and FNO are at lag 1.

Table 4. Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0,05 Critical Value	Probability
None *	0.721949	36.56505	29.79707	0.0071
At most 1	0.408469	12.24598	15.49471	0.1455
At most 2	0.112623	2.270215	3.841466	0.1319

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

Table 4 is the result of the cointegration test. Based on the results above, It is evident that there is evidence of cointegration 1 which is known through the trace test information. In addition, these results are also proven by the probability value which is <0.05 so that further testing will be carried out using the VECM analysis model.

Table 5. VECM Analysis

	D(GDP)	D(FNI)	D(FNO)
D(GDP(-1))	-0.102472	0.058872	-0.113449
	(0.16079)	(0.09643)	(0.15329)
	[-0.63732]	[0.61053]	[-0.74008]
D(FNI(-1))	-0.138190	0.414789	1.015089
	(0.53045)	(0.31813)	(0.50573)
	[-0.26052]	[1.30384]	[2.00718]
D(FNO(-1))	1.026255	0.131370	-0.327854
	(0.25361)	(0.15210)	(0.24179)

	[4.04656]	[0.86371]	[-1.35593]
C	0.052967	-0.025774	-0.018756
	(0.25013)	(0.15001)	(0.23847)
	[0.21176]	[-0.17182]	[-0.07865]

t-table value 1,72913.

Table 5 above describes the results of the VECM analysis. To find out that there is a significant relationship, it is necessary to do a test by comparing t-statistic and t-table value, so it can be seen that the significant relationship occurs in the FNI variable that affects FNO with a t-statistic [2.00718] which is superior to the t-table 1.72913. It can be seen that an increase in FNI in the previous period can affect FNO in the current period. A significant relationship also occurs in FNO and GDP with a t-statistic [4.04656] which is superior to the t-table of 1.72913. Therefore, it may be inferred that the previous period's rise in FNO will have an impact on the current period's GDP..

Significance can also be measured by conducting a test to compare the t-statistic value with the coefficient value. If t-statistic exceeds coefficient value, the measured outcomes are substantially connected. Significance can also be measured by conducting a test to compare the t-statistic value and coefficient value. The measurement result is that if the t-statistic is exceeds the coefficient value, it is significantly related. Considering the results of the VECM analysis above, it can be seen that GDP has a positive impact on FNI with a t-statistic value [0.61053] which is greater than the coefficient value (0.09643). This provides evidence that increased economic growth will increase net FDI inflows. In addition, there is a negative impact of GDP and FNO with the t-statistic [-0.74008] and the coefficient (0.15329). This indicates that increased economic growth will reduce FDI net outflows.

FNI significantly influences on FNI based on t-statistic value [1.30384] and a coefficient value (0.31813). In addition, FNI also has a positive effect on FNO, t-statistic value [2.00718] and a coefficient value (0.50573). This illustrates a positive influence and a beneficial relationship because an increase in FNI will also increase FNO.

FNO significantly influences on GDP with a t-statistic [4.04656] and a coefficient (0.25361). Different results were obtained where previously the increase in GDP had a negative effect. These results illustrate that an increase in FNO is also accompanied by an increase in GDP. FNO significantly influences on FNI t-statistic [0.86371] and a coefficient of (0.15210). So far it can be proven that there is a positive effect between FNO and FNI, which means that an increase in FNO will also increase FNI.

Table 6. Granger Causality Analysis

Null Hypothesis:	Obs	F-Statistic	Prob.
FNI does not Granger Cause GDP	20	4.94172	0.0401
GDP does not Granger Cause FNI		1.01211	0.3285
FNO does not Granger Cause GDP	20	0.28612	0.5996
GDP does not Granger Cause FNO		0.53408	0.4749
FNI does not Granger Cause FNO	20	0.01192	0.9143
FNO does not Granger Cause FNI		0.26435	0.6138

Table 7 above is the Granger Causality Test. Looking at the probability value < 0.05 as the criterion measured, it can be seen that a causal relationship only occurs in the FNI and GDP

variables with a unidirectional causality relationship with a probability value of 0.0401. Meanwhile, the causal relationship between other variables has no significant effect.

Conclusion

According to the research's findings, there is a significant influence between net inflow of FDI, net outflow of FDI, and economic growth as represented by GDP. It is evident that there is a favorable correlation between GDP and FNI, and vice versa. However, it is also seen that there is a negative impact of GDP and FNO. To maintain positive trends and avoid negative impacts, continuous support is needed, such as improving the quality of human resources to help drive economic growth. In addition, industrial and business improvements need to be made so that cooperation with foreign companies is a step to maintain the flow of FDI. Besides that, the causality relationship only occurs in the FNI variable that affects GDP. In the future, this study can be expanded in greater depth by using some appropriate estimation techniques.

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