Research Article

Financial Development Shock and Foreign Direct Investment in Indonesia

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Abstract.
This study analyzed the response of Foreign Direct Investment (FDI) due to the shock on financial development in Indonesia from January 2010 to December 2022. The variables used in this research are FDI and financial development, which measure financial development using traditional measurements such as the Amount of Money in Supply, Credit, and Market Capitalization. Interest Rate and Trade Openness Variables were used as control variables. The study used the VECM method. Results show that in response of the shock on financial development on FDI, Money Supply is positive, Credit negative, and Market Capitalization negative.

Keywords: foreign direct investment, financial development, money supply, credits, market capitalization

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1. Introduction

Progress in the field of investment in recent years has increased so rapidly globally. Where developing countries compete to attract foreign investors who will invest in developing countries. For developing countries foreign investors have an important role in advancing the economy. FDI into a country causes the exchange of technology and market information that will help the country gain new techniques and expertise in the production process to accelerate the economy.

Having its own charm in attracting investors makes developing countries have unique characteristics, namely having a fairly high level of economic growth, underdeveloped financial markets and lack of corporate governance are factors for investors to carry out FDI in developing country markets. UNCTAD (2016) explains that FDI outflows originating from developing countries are expected to progress rapidly in the future. FDI for capital donor countries interested in investing in developing countries because they have something that is promising in the future in the short and long term.

Developing country is a emerging markets have indirectly changed the flow FDI, which originally only had one direction from the developed economy to the global, to

become a flow of FDI in developing country markets that is larger than the flow of FDI globally. Emerging markets have an ever-increasing interest in becoming a source of FDI, so that policy makers and institutions in both developed and developing countries always pay special attention to maintaining investment. The large number of foreign companies originating from FDI in emerging market countries has caused the focus of policy strategy to change frequently. From 2010 until 2015, there were seven developing market economies or emerging market countries such as Indonesia, China, Russia, Brazil, India, Turkey and Mexico, where around 80% of the total market output was in emerging market countries [1].

Uncertainly in the economy and global financial markets will have an impact on the Indonesian economy, one of the areas effected namely investment. Fluctuations caused by FDI in Indonesia can cause Indonesia's economy, financial markets and financial system to be hampered, so it is necessary to regulate the financial system properly through financial development. Indonesia needs to conduct research that discuss the impact of FDI due to a shock to the financial system seen through Financial Development.

Financial Development is a financial system that mobilizes funds to accelerate economic growth in a country. According to the International Monetary Fund in [2], Financial Development has broad dimensions and sizes. Measurement in Financial Development can be seen through the financial sector, namely through financial markets and financial institutions which are proxies called modern measurements through depth, access, efficiency, and stability. In 1970, the measurements for the depth of Financial Development used a traditional approach which was seen through credit ratios and market capitalization which has been carried out by [3] and [4]. In addition [5]; [6]; [4], and [7] use the money supply ratio in calculating Financial Development.

Financial Development that experiences stability and continues to increase in a country will improve the relationship between FDI and economic growth in that country. Meanwhile, emerging market countries including Indonesia as policy makers have lowered various barriers that will make it easier for foreign investors to invest in emerging market countries. The more developed the Financial Development sector will affect credit policy in the host country which has a role in economic growth. If the country's Financial Development has reached its peak, the role of FDI in that country will affect economic growth. The better the Financial Development in a country, the faster the rate of economic growth. The empirical findings identify if a country's Financial Development has reached a threshold, growth for FDI is eliminated. It can happen that credit expansion is regulated by the Financial Development sector which is experiencing a crisis and has

an impact on economic activity. [8] and [9] show that there is a positive influence where FDI depends on policies and environmental conditions in the host country, Financial Development, human capital, trade openness, and economic development. In general, the financial sector has benefits in economic growth. In research [10] it was found that FDI has a role in overall economic growth but the influence exerted between FDI and Financial Development shows results that are not monotonous. To find out better results, the private credit variable is used as a measurement of Financial Development and the results obtained are that FDI on economic growth shows insignificant results. In the literature [11] and [12] the results conclude that Financial Development has a negative and significant effect on FDI. As well as having a weal relationship between Financial Development and Foreign Direct Investment [13].

Based on the previous literature, the authors expect that the overall effect of Financial Development on FDI has clear results. Even though there are differences between previous research regarding the results of Financial Development on FDI, it is certainly an interesting topic for new research. Where in this research was conducted to see and examine the response given by FDI as a result of a shock to Financial Development in Indonesia which is rare and has not been carried out in Indonesia. In addition, this study will examine the amount of variation given by the FDI and Financial Development variables. So that this research gets clear results by showing that the Financial Development system can work well in Indonesia and the expansion of investment by international companies through FDI. This study does not use modern Financial Development calculations, but uses traditional calculations using credit variables, market capitalization, and money supply. The author also adds interest rate and market trade openness as control variables in this study and looks at the relationship between variables, responses and variation contributions.

2. Literature Review

Empirical studies on FDI are well developed and familiar. In this study will look at the influence, response and contribution of financial development variables to FDI. Previous research only focused on influence and looked at the relationship of financial development to Foreign Direct Investment. [14]; [9]; [10]; [15]; [16]; and [17] focus more on research on the effect of Financial Development on FDI. Other researchers such as [3] and [4] measure financial development through credit and market capitalization. In addition, [5]; [6]; [4]; and [7] use the money supply ratio in calculating Financial Development.

Using GMM estimates, [6] and [10] look more at the impact that financial development has on Foreign Direct Investment. Both use the money supply and credit to calculate financial development in a country. Research conducted by [6] uses additional variables, namely trade openness, exchange rates, and interest rates. Where from this research the four variables show positive results that have a significant effect on FDI. Meanwhile, [10] added the inflation rate and GDP to his research and the results obtained were that all positive variables had a significant effect on FDI.

[14] examined directly the effects that financial development would have on Foreign Direct Investment and obtained the result that financial development had a very positive effect on Foreign Direct Investment. This shows that the performance of a country's financial system is able to attract foreign investment. Using the FGLS and 2 SLS methods to see the depth of the financial system whether it affects foreign investment made by [15] shows significant results. The research shows that the financial system is very influential on foreign investment flows. In contrast to other research conducted by [18] using residual investment inefficiency and [12] regarding the impact and response of financial development to FDI. Their research resulted in a significant negative effect.

[9] used the panel data regression method to see does financial deepening attract Foreign Direct Investment and got positive results that had a significant effect. Research conducted by [4] also uses panel data regression by looking at financial development on economic growth, namely by using the money supply and credit variables to calculate financial development and adding trade openness and bank assets to add other factors. Where the results obtained in this study are all the variables used have a positive effect. [19] uses the same method, using panel data regression to see the effect of market size, market openness and inflation on foreign investment in ASEAN countries, which has a significantly positive effect. Meanwhile, research conducted by [20] and [7] uses multiple linear regression estimates. Where is the research conducted by [20] using GDP levels, trade openness, interest rates and inflation on FDI. The results obtained in this study are that the GDP and trade openness variables have a positive effect on foreign investment, while interest rates and inflation have a significant negative effect. For research conducted by [7], namely to see the effect of financial development on economic growth using the money supply, financial development, credit, trade openness and bank assets. Where for the variable financial development, trade openness and private credit have a positive effect, while for the variable money supply and private credit have a negative effect.

Seeing how FDI inflows to emerging markets is carried out by [16] using the fixed effect model, namely obtaining results that do not affect financial development on FDI. The

estimation uses ARDL to see whether there will be an impact from financial development on Foreign Direct Investment using the variables financial market development, inflation, trade openness, and GDP level. From the research conducted by [21] this produced a significant positive effect on all the variables it used. [22] in his research used the Vector Error Correction Model (VECM) method to see whether there is an important role for the domestic market in encouraging foreign investment. Their research uses market trade openness, domestic credit, GDP level, and economic openness as variables. Where this research gets significant positive results for market openness variables, GDP levels, and economic openness. Meanwhile, domestic credit has a significant negative effect on foreign investment.

Even though there have been many studies that have looked at the influence of foreign investment and produced various different impacts and effects. This research was conducted to see the response and contribution made by Financial Development to FDI, where Indonesia is the object of this research and to provide information to maintain financial system stability. This study also uses the VECM method to obtain responses and contributions to variationH9: Job opportunities strengthen the effect of role stress on auditor turnover intention.

3. Research Methods

3.1. Data

This study takes the object of Foreign Direct Investment in Indonesia with the independent variable Financial Development which consists of the variables money supply, Credit, Market Capitalization, Trade Openness, and Interest Rate. This study takes monthly data for the period from January 2010 until December 2022 to see the response given by FDI when the Financial Development variable experiences a shock in Indonesia, which is an emerging market country.

This research was conducted using data sources that belong to the secondary data group which were taken and collected from the related publication from World Bank, Statistik Ekonomi and Keuangan Indonesia, BPS, Indonesian Stock Exchange, and other sources. The specifics of all variables are provided in Table 1.

Table 1: Description of the Variable.

Variable Name	Symbol	Measurement	Source
Foreign Direct Investment	**FDI**	Foreign Direct Investment, New Inflow/GDP	World Bank
Money Supply	**M2**	M2/GDP	SEKI
Credit	**CR**	Credit/GDP	SEKI
Market Capitalization	**MC**	Market Capitalization/GDP	BEI
Interest Rate	**IR**	Central Bank Policy Interest Rate	SEKI
Trade Openness	**TO**	Total Export+Total Import/GDP	BPS

3.2. Econometric Methodology

This study uses data on FDI and Financial Development in Indonesia. Indicators for measuring Financial Development are by looking at the money supply, credit and market capitalization in a country. This study also adds interest rate and trade openness variables. In order to see and measure shock and the variation contribution given by the Financial Development variable to FDI we used VAR or VECM method.

Vector Auto Regression (VAR) method can be used if the research analysis reaches stationary and is not exposed to cointegration. If the data indicates integration, them proceed with the Vector Error Correction Model (VECM) method. In a research analysis that adopted the VAR or VECM, it was carried out in stages. This stages in this model begin with Unit Root Test, Lag Length Criteria, Cointegration Test, VECM model analysis, Grangger Causality Test, Impulse Response Function (IRF), and Variance Decomposition. The tool used to analyze research using the VAR method or VECM method using EVIEWS.

In this way the general equation of the VAR model or VECM used can be written as follows:

$$Y it = \beta 0 + \beta i1 \sum_{i=0}^{p} Y it + \beta i1 \sum_{i=0}^{p} Y 2t - 1 \ldots \ldots \cdots + \beta i1 \sum_{i=0}^{p} Y nt - 1 + \epsilon 1t \qquad (1)$$

Variables are included in our VECM model including FDI, Model Supply, Credit, Market Capitalization, Trade Openness, and Interest Rate as follows:

$$FDIt = \beta0 + \beta1 \sum_{i=0}^{p} FDI1t - 1 + \beta2 \sum_{i=0}^{p} M22t - 1 + \beta3 \sum_{i=0}^{p} CR3t - 1 + \beta4 \sum_{i=0}^{p} IR4t - 1$$

$$+ \beta5 \sum_{i=0}^{p} TO5t - 1 + \beta6 \sum_{i=0}^{p} MC6t - 1 + \epsilon1t$$

(2)

$$M2It = \beta0 + \beta1 \sum_{i=0}^{p} M21t - 1 + \beta2 \sum_{i=0}^{p} FDI2t - 1 + \beta3 \sum_{i=0}^{p} CR3t - 1 + \beta4 \sum_{i=0}^{p} IR4t - 1$$

$$+ \beta5 \sum_{i=0}^{p} TO5t - 1 + \beta6 \sum_{i=0}^{p} MC6t - 1 + \epsilon1t$$

(3)

$$CRIt = \beta0 + \beta1 \sum_{i=0}^{p} CR1t - 1 + \beta2 \sum_{i=0}^{p} FDI2t - 1 + \beta3 \sum_{i=0}^{p} M23t - 1 + \beta4 \sum_{i=0}^{p} IR4t - 1$$

$$+ \beta5 \sum_{i=0}^{p} TO5t - 1 + \beta6 \sum_{i=0}^{p} MC6t - 1 + \epsilon1t$$

(4)

$$IRIt = \beta0 + \beta1 \sum_{i=0}^{p} IR1t - 1 + \beta2 \sum_{i=0}^{p} FDI2t - 1 + \beta3 \sum_{i=0}^{p} M23t - 1 + \beta4 \sum_{i=0}^{p} CR4t - 1$$

$$+ \beta5 \sum_{i=0}^{p} TO5t - 1 + \beta6 \sum_{i=0}^{p} MC6t - 1 + \epsilon1t$$

(5)

$$TOIt = \beta0 + \beta1 \sum_{i=0}^{p} TO1t - 1 + \beta2 \sum_{i=0}^{p} FDI2t - 1 + \beta3 \sum_{i=0}^{p} M23t - 1 + \beta4 \sum_{i=0}^{p} CR4t - 1$$

$$+ \beta5 \sum_{i=0}^{p} IR5t - 1 + \beta6 \sum_{i=0}^{p} MC6t - 1 + \epsilon1t$$

(6)

$$MCIt = \beta0 + \beta1 \sum_{i=0}^{p} MC1t - 1 + \beta2 \sum_{i=0}^{p} FDI2t - 1 + \beta3 \sum_{i=0}^{p} M23t - 1 + \beta4 \sum_{i=0}^{p} CR4t - 1$$

$$+ \beta5 \sum_{i=0}^{p} IR5t - 1 + \beta6 \sum_{i=0}^{p} TO6t - 1 + \epsilon1t$$

(7)

In terms of the econometric model, there are several steps involved in estimating the data for the VECM model. The stages of model estimation are as follows:

a. Unit Root Test

In the analysis of research using time series, it is assumed that the data used must be stationary with the unit root test. Testing to see whether data is stationary or not in the variables used requires an Augmented Dickey Fuller (ADF) test with a significance level of 5% or 0.05. if in the first difference stationary test it's not stationary then in the ADF test it will produce stationary then use VAR while data that is not stationary is at the first difference level than use the VECM model.

b. Cointegration Test

The stages in the cointegration test are to find out whether there is a relationship between variables in the long term. If the results show that there is cointegration between variables, these variables have a long term relationship. Variables affected by cointegration will then be continued using VECM.

c. VAR or VECM Model Estimation

In estimating the making of the VAR model of course it refers to the results of the VAR assessment using the optimum lag. In addition to the optimum lag, the VAR model can be continued if it's is not exposed to cointegration.

When the research data is exposed to cointegration. Research using the VECM model can look at long term and short term relationships between endogenous variables.

d. Granger Causality Test

Granger causality test is used to see the relationship between variables. If the number of lags entered is greater, the model used will be longer. This test will we how the independent variable can cause the dependent variable, if the realization of the independent variable takes precedence over the dependent variable. That way this test can be tested with the VAR model. If the Granger causality test results have been obtained, then it is reviewed based on the probability value. When the probability is smaller than alpha, the relationship has a significant effect, but when the probability value is greater than alpha, the relationship between variables has no significant effect.

e. Impulse Response Function Test

Impulse Response Function (IRF) test is used to see shock in one variable that will affect other variables. The duration or magnitude of the influence of the shock of a variable on other variables to reach the balance point starts from the fluctuating which will move towards a stable balance point, so that can be witnessed by using the Impulse Response Function (IRF) test.

f. Variance Decomposition

Variance Decomposition test stage of forecast error variance decomposition will provide an explanation of the proportion and duration of shock that occur in a variable against other variables or with the variable itself in this period and in the future. In addition, VD test will look at the percentage obtain when this variable can be influenced by other variables.

4. Results and Discussion

4.1. Result

4.1.1. Uni Root Test

In the VAR or VECM method, this is done by conducting stationary tests on the variables FDI, Money Supply (JUB), Credit (CR), Market Capitalization (MC), Trade Openness (TO) and BI interest rate (IR). The decision-making criterion in the stationary test is by looking at the ADF (Augmented Dickey-Fuller) probability value. If the ADF probability value $<$ α (alpha), it means that the data stationary at zero degree. Meanwhile, when the ADF probability value $> \alpha$ (alpha) it means that data is not stationary at zero degree.

Table 2 summarize the results of the unit root test. The table presents the Augmented Dicky-Fuller (ADF) and Mackinnon's Critical Value, where the research variables are not stationary at the level but stationary at the first difference

4.1.2. Cointegration Test

The cointegration test can be carried out when all research variables are stationary at the level or first difference level. If during the stationary test the data is stationary at the level then use the VAR model. if the data is stationary at the first difference level then use the VECM model. In the cointegration test it can be known by comparing the Trace Statistical value with the Critical Value, where in the cointegrating test results using EVIEWS there is a statement "Trace test indicates cointegrating eqn(s) at 0.05 level.

Table 3 summarizes the results of the cointegration test. The table presents the results of the cointegration test in terms of trace statistics and critical value. Where the value of trace statistics is greater than the critical value, the variable is cointegrated. Of all the variables used it shows that all variables are cointegrated, so it can be continued by using VECM model.

TABLE 2: Unit Root Test.

Variable	ADF Value	MacKinnon's Critical Value			Information
		1%	5%	10%	
Level					
D(FDI)	-2.330661	-3.473382	-2.880336	-2.576871	Not Stationary
D(M2_PDB)	0.156281	-3.473096	-2.880211	-2.576805	Not Stationary
D(KREDIT_PDB)	-2.547707	-3.472813	-2.880088	-2.576739	Not Stationary
D(MARKET_CAP_PDB)	-0.591721	-3.473967	-2.880591	-2.577008	Not Stationary
D(TRADE_OPENESS	-1.533759	-3.473382	-2.880336	-2.576871	Not Stationary
D(BI_RATE)	-1.529836	-3.473096	-2.880211	-2.576805	Not Stationary
First Difference					
D(FDI)	-5.872258	-3.473382	-2.880336	-2.576871	Stationary
D(M2_PDB)	-11.44228	-3.473382	-2.880336	-2.576871	Stationary
D(KREDIT_PDB)	-3.176141	-3.474567	-2.880853	-2.577147	Stationary
D(MARKET_CAP_PDB)	-10.10914	-3.473967	-2.880591	-2.577008	Stationary
D(TRADE_OPENESS	-12.97927	-3.473382	-2.880336	-2.576871	Stationary
D(BI_RATE)	-7.339478	-3.473096	-2.880211	-2.576805	Stationary

TABLE 3: Cointegration Test.

Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value	Prob.**
None *	431.5354	95.75366	0.0001**
At most 1 *	300.2583	69.81889	0.0001**
At most 2 *	201.4271	47.85613	0.0000**
At most 3 *	107.8317	29.79707	0.0000**
At most 4 *	54.82103	15.49471	0.0000**
At most 5 *	20.67842	3.841466	0.0000**

4.1.3. VAR or VECM Model Estimation

First, the model was estimated to examine the interrelationship between Foreign Direct Investment, money supply, credit, market capitalization, trade openness, and interest rate by applying VECM. Lag 1 was selected as the optimal lag based on the Akaike information criteria. The results are presented in Table 4.

Table 4 summarizes the results of the cointegration test. The table presents a summary of the results of long-term and short-term VECM estimation with a t-table value

TABLE 4: Result of VECM Estimation.

Variable	Coefficient	T statistic	Information
Long Term			
M2_PDB(-1)	-1.973523	-1.92623	Significant
KREDIT_PDB(-1)	-3.655081	-1.94045	Significant
MARKET_CAP_PDB(-1)	-0.029947	-7.69864	Not Significant
TRADE_OPENESS(-1)	-227.2161	-8.94301	Not Significant
BI_RATE(-1)	-1.316260	-1.40893	Significant
Short Term			
CointEq1	-0.017893	-3.81210	Significant
D(FDI(-1),2)	-0.404810	-6.11844	Significant
D(M2_PDB(-1),2)	-0.012891	-0.48438	Significant
D(KREDIT_PDB(-1),2)	-0.121070	-1.69722	Significant
D(MARKET_CAP_PDB(-1),2)	-0.000773	-6.42944	Significant
D(TRADE_OPENESS(-1),2)	-0.384928	-0.48931	Significant
D(BI_RATE(-1),2)	-0.050000	-0.98452	Significant
C	0.000466	0.04941	

of -1.9759. where in the long-term and short-term VECM estimation results the money supply variable has a negative significant effect on FDI as measured by the coefficient -1.973523 for the long term and -0.017893 for the short term. The results of long-term and short-term VECM estimation of the credit variable, namely a significant negative effect on FDI, are measured by the long-term coefficient of -3.655081 and the short-term coefficient of -0.404810. The effect of market capitalization on FDI in the long run is insignificantly negative with a coefficient of -0.029947, while the yield in the short term is significantly negative with a coefficient of -0.000773. the estimation results or trade openness to FDI in the long term is negative and has no significant effect with a coefficient of -227.2161, while the short term estimation result is negative significant effect with a coefficient of -0.384928. The influence of interest rate on FDI in the long term has a significant negative effect with a coefficient of -1.316260 and -0.050000 for the short term.

4.1.4. Granger Causality Test

The causality test is carried out to see the direction of the relationship of the variables in the money supply, credit, market capitalization, trade openness, and interest rate on FDI that have a strong relationship, namely a two-way relationship or a unidirectional

relationship by comparing the probability value and the critical value. The results are presented in Table 5.

TABLE 5: Result of Granger Causality Test.

Null Hypothesis:	Obs	F-Statistic	Prob.
M2_PDB does not Granger Cause FDI	154	0.07109	0.9314
FDI does not Granger Cause M2_PDB		0.14233	0.8675
KREDIT_PDB does not Granger Cause FDI	154	0.17580	0.8390
FDI does not Granger Cause KREDIT_PDB		0.57388	0.5646
MARKET_CAP_PDB does not Granger Cause FDI	154	4.46707	0.0131
FDI does not Granger Cause MARKET_CAP_PDB		0.34437	0.7092
TRADE_OPENESS does not Granger Cause FDI	154	4.50608	0.0126
FDI does not Granger Cause TRADE_OPENESS		1.31119	0.2726
BI_RATE does not Granger Cause FDI	154	1.49732	0.2271
FDI does not Granger Cause BI_RATE		4.66642	0.0108

Table 5 summarizes the results of the granger causality. The table presents the results of the causality test, where the money supply and credit variables have no relationship to FDI. Market capitalization and trade openness have a strong relationship with FDI namely a two-way relationship. Meanwhile, the interest rate variable only has a one-way relationship with FDI.

4.1.5. Impulse Response Function Test

Figure 1 illustrates the relationship between Foreign Direct Investment, money supply, credit, market capitalization, trade openness, and interest rates and will be illustrated through the IRF. We examined the impulse response function generated by the FDI variable to shocks in the money supply, as seen in the 2nd, 3rd and 4th periods FDI responded positively by 0.006856; 0.008626; 0.009016 standard deviation. It can be seen that shock in the money supply of one standard deviation in the 5th and 7th periods were responded negatively by FDI of 0.003199 and 0.005234 standard deviations. In the 8th period of 0.007952 standard deviations tend to be stable until in the 10th period of 0.007353 standard deviations.

Impulse response function generated by the FDI variable on credit shocks can be seen in the 2nd and 3rd periods, FDI responds negatively by -0.005543 and -0.005016 standard deviation and FDI response due to credit shocks in the 5th period it decreased again by 0.003755 standard deviation. It can be see that credits shocks of one standard

deviation in the 6th, 7th, 9th periods tent to be stable up to -0—4842 standard deviation in the 10th period. The shocks given by trade openness to FDI are see from the impulse response function which can be seen in the 2nd period a negative response of 0.020541, the 3rd period a positive response and an increase of 0.022743, in the 4th period there was a shocks and decreased again of -0.013356, and responded positively again in the 5th period 0.003735 standard deviation. In the 6th to 10th period the standard deviation tends to be stable at -0.000112.

We also examined the impulse response function generated by the FDI variable on interest rate shocks, as seen in the 2nd period the response was negative by -0.004606, the 3rd period experienced an increase of 0.002439, in the 4th period there was a shock and the negative response decreased again by -0.002956, and in the 5th period it has increased. In the 6th to 10th period the standard deviation tends to be stable at -0.001033 in the 10th period.
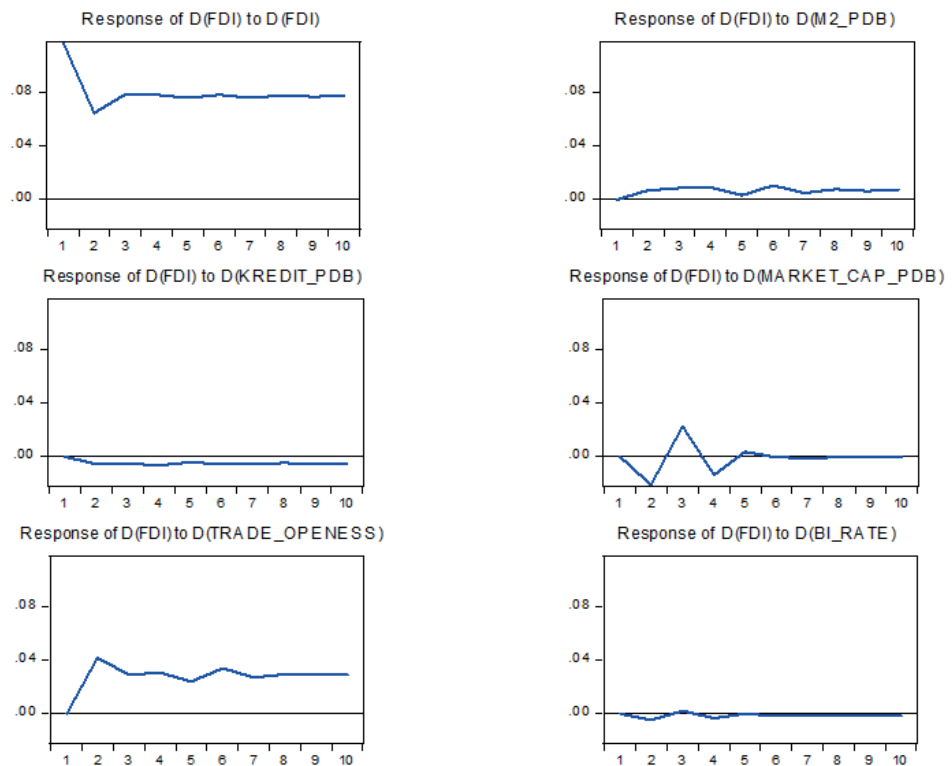

Figure 1: Results of Impulse Response Function (IRF)

4.1.6. Variance Decomposition

Table 6 explains the Variance Decomposition of the FDI variable and how much other variables contribute to the FDI variable. The Variance Decomposition results on the FDI

variable are dominated by shocks on the variable itself from the beginning to the end of the period. The large value contribution of FDI that occurs in the variable itself can be interpreted by the behavior of foreign investors that can influence the development of FDI. In the first period, FDI affected the variable itself by 100% and in the 4th period it decreased to 85,64%. In the 5th period it experienced an increase and decrease in the 6th period and continued to increase until the 10th period. The increase caused by FDI affecting the variable itself became 86,09% in the 10th period.

TABLE 6: Results of Variance Decomposition (VD).

Period	S.E.	D(FDI)	D(M2_PDB)	D(KREDIT_PDB)	D(MARKET_CAP_PDB)	D(TRADE_OPENESS)	D(BI_RATE)
1	0.116655	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.141729	88.60794	0.233984	0.152979	2.100551	8.798945	0.105599
3	0.166664	86.43558	0.437095	0.201219	3.381067	9.447262	0.097778
4	0.187545	85.64574	0.576309	0.264439	3.177232	10.23422	0.102053
5	0.203910	86.35566	0.512138	0.257610	2.721279	10.06697	0.086338
6	0.221450	85.76543	0.656815	0.276885	2.307578	10.91592	0.077366
7	0.235884	86.02565	0.628128	0.293306	2.034443	10.94947	0.069006
8	0.250377	86.04623	0.658388	0.293313	1.805754	11.13286	0.063453
9	0.263742	86.04876	0.658200	0.303870	1.627512	11.30342	0.058235
10	0.276531	86.09588	0.669432	0.307067	1.480471	11.39278	0.054370

The second biggest contribution is the trade openness variable, which in the 2nd period contributed 8,79% and in the 4th period it increased by 10,23% but decreased in the 5th period to 10,06%. In the 6th periods there was an increase in trade openness contribution of 11,39%. The biggest contribution made by market capitalization was in period 3 of 3,38%. For the money supply and credit variables, the biggest contribution was in period 10 of 0,66% and 0,30%, respectively. We also look at the contribution made by interest rate to FDI, which is 0,10% in period 2.

4.2. Discussion

4.2.1. Relationship Between the Money Supply And FDI

Money supply variable for FDI in Indonesia for the period January 2010 to December 2022 has a significant effect in the long and short term. In the long-term VECM estimation the money supply variable has a t statistic value of -1.92623 which is greater than the t table (-1.975905) so the money supply variable has a significant effect on the first lag (1) with a significant level of 5%. The coefficient value of the money supply is

-1.973523 meaning that if there is a 1 percent increase in the money supply, it will reduce the percentage of the variable FDI in Indonesia by 1.97%. While the results obtained from the short-term VECM estimation of the money supply variable have a t statistic value of -0.012891 which is greater than t table (-1.975905) so that the money supply variable has a significant effect on the first lag (1) with a 5% significance level. The coefficient value of the money supply is -0.48438 meaning that if there is a 1 percent increase in the money supply, it will reduce the percentage of FDI variables in Indonesia by 0.48% and other variables are considered constant or ceteris paribus.

Response given by FDI due to a shock to the money supply also showed positive results. This is in accordance with research [6] where there is a positive relationship between the money supply and FDI. The results of this study contradict the quantity theory of money supply developed by Irving Fisher, where an unbalanced demand for goods and services will cause too much money in circulation in society and will cause the value of the currency to weaken. Too much money circulating in the community will cause the value of the currency and the country is vulnerable to inflation. This is a consideration for investors to invest. This study found that an increase in the money supply will increase investment inflows. These findings are in line with research conducted by [6] and [23] expansion and increase in the money supply can accelerate the development of investment rates where the amount of money circulating in society must be immediately channeled back to consumption spending, banking and expanding investment in order to maintain economic stability. Research that was also conducted [9] explains that FDI is able to expand the money supply which is able to see the depth of a country's financial system.

Based on the Variance Decomposition (VD) test, the variation contribution given by the money supply variable to Foreign Direct Investment (FDI) is 0.66% in the 10th period. This shows that when the money supply increases it will cause FDI inflows to increase.

4.2.2. Relationship Between the Credit And FDI

Domestic credit variables on FDI in Indonesia for the period January 2010 to December 2022 have a significant effect in the long and short term. In the long-term VECM estimation the domestic credit variable has a t statistic value of -1.94045 which is greater than the t table (-1.975905) so that the domestic credit variable has a significant effect on the first lag (1) with a significant level of 5%. The domestic credit coefficient is -3.655081, meaning that if there is a 1 percent increase in domestic credit, it will reduce the percentage of the variable Foreign Direct Investment (FDI) in Indonesia by 3.65%.

While the results obtained from the short-term VECM estimation of the domestic credit variable have a t statistic value of -0.121070 which is greater than the t table (-1.975905) so that the domestic credit variable has a significant effect on the first lag (1) with a significant level of 5%. The coefficient value of domestic credit is -1.69722 meaning that if there is a 1 percent increase in domestic credit, it will reduce the percentage of FDI variables in Indonesia by 1.69%, and other variables are considered constant or ceteris paribus.

Response given by FDI due to a shock to the amount of credit showed negative results. according to [24] credit can determine the future of a country's investment through interest rates. When interest rates are low, investors will take action to make loans or credit with the aim of expanding investment. But when interest rates increase, it causes people to be reluctant to take credit, this can reduce the level of investment because people are reluctant to expand their business with high credit interest rates. The results of this study are in line with research conducted [10], where private credit as an indicator of financial development has a negative and statistically significant effect. This is because it shows the effect of declining FDI growth. The variation contribution given by credit to FDI in the Variance Decomposition (VD) test is 0.3% in the 10th period. This shows that if people take credit programs with high interest rates, the investment flow will not be too high.

4.2.3. Relationship Between the Market Capitalization And FDI

Market capitalization variable on FDI in Indonesia for the period January 2010 to December 2022 has no significant effect in the long term and has a significant effect in the short term. In the long term VECM estimation the market capitalization variable has a t statistic value of -7.69864 which is smaller than the t table (-1.975905) so the market capitalization variable has no significant effect on the first lag (1) with a 5% significance level. While the results obtained from the short-term VECM estimation of the market capitalization variable have a t statistic value of -0.000773 which is greater than t table (-1.975905) so that the market capitalization variable has a significant effect on the first lag (1) with a 5% significance level. The market capitalization coefficient value is -6.42944 meaning that if there is a 1 percent increase in market capitalization, it will reduce the percentage of FDI variables in Indonesia by 6.42%, and other variables are considered constant or ceteris paribus.

Response given FDI due to a shock to the total market capitalization showed negative results. The results of this study are not in accordance with signal theory, where all

company information obtained will be a signal for investors to be sensitive in taking investment decision actions. When the information conveyed is positive news, the market will respond immediately when there is a change in stock trading volume. Growth in stock trading volume will have an impact on the capitalization of a company. When the capitalization value of a company decreases, investors from that company will withdraw their capital again, because countries with companies that have small capitalization are considered not to have big profits for investors.

The results obtained from this study indicate that the market capitalization variable with FDI does not have a significant relationship but the causality test has a two-way relationship. The results of this study are in accordance with research conducted in 2022 by [18]. Based on the Variance Decomposition (VD) test, the variation contribution given by the market capitalization variable to FDI is 3.3%8 in the 3rd period. This shows that when market capitalization increases, it will cause FDI inflows to decrease.

4.2.4. Relationship Between the Trade Openness And FDI

Trade openness to FDI in Indonesia for the period January 2010 to December 2022 has no significant effect in the long term and has a significant effect in the short term. In the long-term VECM estimation the trade openness variable has a t statistic value of -8.94301 which is smaller than the t table (-1.975905) so the trade openness variable has no significant effect on the first lag (1) with a 5% significance level. The coefficient value of trade openness is -227.2161 meaning that if there is a 1 percent increase in trade openness in Indonesia, it will reduce the percentage of FDI variables in Indonesia by 227.21%. While the results obtained from the short-term VECM estimation of the trade openness variable have a t statistic value of -0.384928 which is greater than t table (-1.975905) so the trade openness variable has a significant effect on the first lag (1) with a significant level of 5%. The coefficient value of trade openness is -0.48931 meaning that if there is a 1 percent increase in trade openness in Indonesia, it will reduce the percentage of FDI variables in Indonesia by 0.48%, and other variables are considered constant or ceteris paribus.

In the Heckscher-Ohlin theory of international trade, it can be concluded in this theory that countries that have more labor factors will export in the form of labor-intensive and will import in the form of capital-intensive or foreign investment inflows [25]. When a trade openness policy has been implemented, it will provide major benefits for the country, because trade openness will establish closer relations with other countries, have a broad market and benefit in the form of technology and knowledge transfer. More

open trade openness will facilitate and attract foreign investors to invest, because the country has a broad market and attractive potential. Vice versa, when market openness tends to be closed it will reduce the level of FDI.

Response given by FDI due to shocks to market openness showed a positive response. This is in accordance with the theory and research that has been carried out by [6]; [10]; [21]; [17] and [22], where when a country has a wider market openness policy it will cause the flow of foreign investment into the country to increase due to the opening of a large market share without any obstacles. The variation contribution given by the market openness variable to FDI in the Variance Decomposition (VD) test was 11.39% in the 10th period. This shows that market openness has a large enough market share, so that it is able to increase foreign investment into the country.

4.2.5. Relationship Between the BI Rate And FDI

BI Rate variable on FDI in Indonesia for the period January 2010 to December 2022 has a significant effect in the long and short term. In the long term VECM estimation the BI Rate variable has a t statistic value of -1.40893 which is greater than the t table (-1.975905) so the BI Rate variable has a significant effect on the first lag (1) with a significant level of 5%. The BI Rate Coefficient value is -1.316260 meaning that if there is a 1 percent increase in the BI Rate, it will reduce the percentage of FDI variables in Indonesia by 1.31%. While the results obtained from the short-term VECM estimation of the BI Rate variable have a t statistic value of -0.050000 which is greater than t table (-1.975905) so the BI Rate variable has a significant effect on the first lag (1) with a significant level of 5%. The BI Rate Coefficient value is -0.98452 meaning that if there is a 1 percent increase in the BI Rate, it will reduce the percentage of FDI variables in Indonesia by 0.98%, and other variables are considered constant or ceteris paribus. In the theory of the International Irving Fisher effect, it explains that when foreign interest rates are lower than domestic interest rates, there will be an increase in foreign currency. When the foreign interest rate is higher than the domestic interest rate, there will be a decline in foreign currency and is able to attract FDI to invest.

However, the results of the IRF test due to a shock to interest rates showed negative results. These results are in line with research conducted by [20]. This shows that if the BI interest rate increases, it will cause investment inflows to decrease due to high interest rates and the possibility that the country is being hit by a crisis or inflation which causes it to issue policies to raise interest rates. The variation contribution given by the BI Rate interest rate variable to FDI in the Variance Decomposition (VD) test is 0.1% in

the 2nd period. This shows that if the BI Rate interest rate increases, it will cause a reciprocal increase in the contribution of variations in foreign investment, only slightly, namely 0.1%.

5. Finding and Conclusion

Based on the results of the research and discussion regarding Foreign Direct Investment (FDI) Responses Due to Shock in Financial Development in Indonesia for the period January 2010 to December 2022, the conclusions that can be drawn from this study are as follows:

1. Result of Impulse Response Function (IRF) FDI's response to the money supply received a positive response, this shows that if there is an increase in the money supply, it will cause FDI flows to increase. FDI's response to credit was responded negatively, this shows that if there is an increase in the amount of credit, it will cause the flow of FDI to decrease. FDI's response to market capitalization is responded negatively, so when there is an increase in the amount of market capitalization, it will cause FDI flows to decrease. FDI's response to trade openness was responded positively, indicating that if there is an increase in trade openness, it will cause FDI flows to increase. The response of FDI to the BI Rate was responded negatively, this shows that if there is an increase in the BI Rate, it will cause the flow of FDI to decrease.

2. Variance Decomposition (VD) Results The results that can be concluded are based on the variance decomposition (VD) test, namely where the variable that has the greatest contribution to Foreign Direct Investment (FDI) in Indonesia is the Foreign Direct Investment (FDI) variable itself with a value of 100%. As for the variable with the largest contribution to Foreign Direct Investment (FDI), then sequentially are the variables of trade openness, market capitalization, money supply, credit, and the BI Rate.

6. Implications, Limitations, and Suggestions

The implication of this research is where we found that not all financial development measurement indicators that experienced a shock were able to increase FDI flows in Indonesia. We also found some limitations in this study. where this research only uses a scope limited to Indonesia with a short period of time and uses traditional indicators to

measure financial development. We suggest for further research to add several samples of other countries and new variables with a longer period. Researchers also suggest using modern indicators to measure financial development. Therefore, we hope that this research can provide new insights for readers and become a reference when future researchers will discuss the same topic. In addition, based on the previous conclusions, there are several policies that we can recommend for the future:

1. In managing the flow of FDI to continue to increase and be stable, institutions that are directly related to FDI need to pay attention to the negative response generated by the variable financial development.

2. Bank Indonesia as the Central Bank needs to maintain the stability of the money supply and the number of creditors and set the BI Rate so that the flow of FDI in Indonesia shows a positive response.

3. In regulating market capitalization and trade openness in maintaining the stability of FDI in Indonesia, the Indonesia Stock Exchange (IDX) and other institutions that have links to the variables of trade openness and market capitalization need to review the negative response given by FDI due to shocks on market capitalization variables and trade openness to remain stable.

4. Financial Development stability is needed in order to keep FDI flows in Indonesia stable. Because the stability of Financial Development and FDI plays an important role in driving economic growth.

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