

# Determinants of Foreign Direct Investment in Indonesia After Pandemic

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## ABSTRACT

**Research Originality:** The Covid-19 pandemic brought out the phenomenon of a rapid increase in investment after it has ended in Indonesia. This study gives a significant contribution in analyze the impact of pandemic on foreign direct investment.

**Research Objectives:** The aim of this research is to predict whether there is a relationship of interest rates, inflation, labor force, GDP, and exchange rate with investment.

**Research Methods:** This research is also to examine the asymmetric relationship among variables using the NARDL (Nonlinear Autoregressive Distributed Lag) method to identify the long-run effects of these variables on the investment after the Covid-19 pandemic in Indonesia. It uses the secondary data from 1980-2022.

**Empirical Results:** The results of research show that there is a long-run asymmetric effect of the variables of interest rates, GDP, and exchange rates on the foreign direct investment. It means that changes in these variable factors do not only affect the size of investment, but also the speed of its increase after the pandemic. Meanwhile, there is no asymmetric effect of the variables of labor force and inflation on the investment.

**Implications:** This research provides a picture and new insights related to the foreign direct investment dynamics in Indonesia after the Covid-19 pandemic. This study implies that require a different policy approach in an effort to increase the investment in Indonesia.

## Keywords:

investment; gross domestic products; covid-19; non-linear autoregressive distributed lag (NARDL)

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## INTRODUCTION

The year 2020 was the beginning of the crisis in Indonesia, precisely in March when it was confirmed that Indonesia had tested positive for the COVID-19 outbreak. The disease outbreak spread rapidly in all countries of the world. The government has also taken policy decisions to minimize the very rapid spread of this virus by implementing social restrictions, maintaining distance from other people, reducing traveling outside the house, and temporarily discontinuing the community's economic activities (Jiang et al., 2021). At the beginning of the COVID-19 presence, the government as policymakers only focused on handling the health, which threatened many lives and even death. However, it turned out that the COVID-19 pandemic has caused much harm to other parties, including the economy in Indonesia.

Economic recovery is the primary goal of the problems that are occurring. The existing policies to minimize the spread of COVID-19 resulted in economic activity discontinuing (Sánchez et al., 2022). The COVID-19 pandemic outbreak was not only detrimental to the health sector; in 2020, it also had an impact on foreign direct investment (FDI) in ASEAN, which decreased by 25% to US\$137 billion, whereas, in 2019, the previous value reached US\$182 billion (Atri et al., 2023).

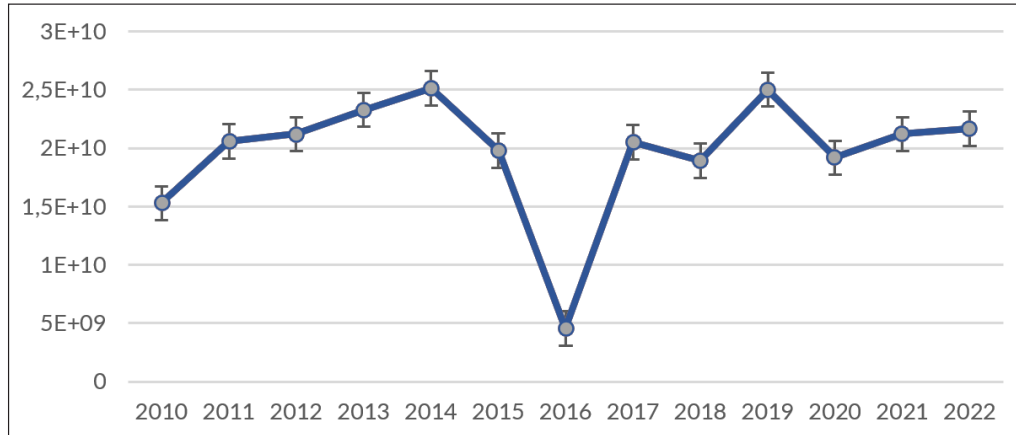
Indonesia is a country that has thousands of islands spread out with a very large population, many provinces, and diverse natural resources that are attractive to investors either from within or outside the country (Budiono & Purba, 2023). Indonesia still really needs a large budget to implement sustainable economic development. Relying on domestic funds alone is still insufficient to carry out the development because the amount of domestic savings still needs to be increased to meet the required investment. Investment is considered an essential factor in the economic growth (Bader, 2010). There are three financing efforts to obtain the investment: debt-related financing, domestic financing, and foreign direct investment (Morrissey & Udomkerdmongkol, 2012).

Domestic financing can be provided through debt, while foreign investment can be a joint venture with other investors in the country. Compared with the portfolio, foreign direct investment is more profitable. This condition is because the state feels the investment is conducted in the form of capital, transfer of knowledge, and technology (Lembong, 2013). Foreign Direct Investment (FDI) is essential for achieving sustainable growth in any country, including Indonesia. FDI is an important factor in encouraging economic growth in each country (Asiamah et al., 2019).

Indonesia is one of the countries that requires foreign capital as a source of financing for domestic development. Investment in foreign countries is an important form of international capital flow. It is also an inevitable trend in economic globalization, just as Foreign Direct Investment (FDI) is the main driving force of the global economy today (Ma & Du, 2022). Trends in foreign direct investment in Indonesia fluctuate every year. This condition may happen because Indonesia, as a developing country, is tied to global economic conditions, which could be due to a financial crisis, a trade war, or significant conditions such as the United States or Europe that can influence the investors' interest

to invest in Indonesia (Caballero, 2013). Trends in foreign direct investment can be seen in Figure 1.

Figure 1. Foreign Direct Investment in 2010-2022



Source: World Bank (2023)

Based on the data in Figure 1, it can be seen that foreign direct investment in Indonesia fluctuated in 2010-2022. From 2010 to 2014, investment in Indonesia has increased every year. However, in 2015, foreign direct investment experienced a significant decline, and this was also followed in the following year, in 2016, in which it experienced a more drastic decline. In 2017, foreign direct investment increased again, but in 2018, it experienced another decline, although slightly, and in 2019, it increased again. However, in 2020, the investment experienced another significant decline due to the COVID-19 outbreak that almost affected the whole world, not just Indonesia, and also caused huge losses for all countries (World Bank, 2023).

Based on the data World Health Organization recorded until October 28th 2022, the total number of confirmed cases of COVID-19 reached 629 million with 6.59 million deaths. Therefore, the spread of the COVID-19 pandemic has significantly impacted aspects of life in the economic, social, and health sectors worldwide (Zhang et al., 2023). During the 2016-2022 period, investment in Indonesia experienced relatively slow growth, in addition to the pandemic outbreak in Indonesia in 2020. This situation is very worrying not only in Indonesia but also in countries worldwide. Then, in 2019, the investment experienced an increase from the previous year but decreased again in 2020, which occurred due to the impact of the COVID-19 pandemic that had a significant effect on the economy in Indonesia, including a decrease in foreign direct investment in Indonesia.

An economic condition can be seen from the condition of its capital market. The country's economic condition is correlated with the condition of its capital market. However, the capital market tends to be more reactive to potential crises. This tendency may occur because capital market players generally have a forward look, which is the estimation of the company's financial performance in the future. Viewing the problems in Indonesia, where the COVID-19 pandemic has increased enormous economic uncertainty

(Rito & Azzahra, 2018), this is the leading cause of the decline in investor confidence that impacts the decline in investment, as seen in Figure 1.

The year 2022 is the new normal era where there will be an increase in investment achievements. Based on Badan Koordinasi Penanaman Modal (2022) has published data on investment realization achievements in the first quarter (January-March period) in 2022 amounted to IDR 282.4 trillion, which was higher by 28.5% compared to the same period in 2021. The achievements for the first quarter of 2022 also experienced an increase of 16.9% compared to the fourth quarter of 2021. The achievements for the first quarter of 2022 also contributed 23.5% of the budgeted realization target of IDR 1,200 trillion. Viewing the increase in investment realization, it increased by double digits in the first quarter of 2022 compared to the first quarter of 2021. This data shows that the confidence of domestic and foreign investors is increasing in government policies, especially in the investment sector. Indonesia is one of the investment targets, considering that the Southeast Asian region still has great potential compared to other countries or regions after the end of the pandemic. With the soaring increase in investment, it is hoped that it can create quality jobs for the community, mainly due to the large number of workers being laid off due to the impact of the pandemic. Therefore, to support the community's welfare, the government needs to work hard to overcome this matter and increase the investment so that the community can feel the benefits in the future.

It is interesting for the writers to identify the factors that caused the investment to proliferate after the Covid-19 pandemic. At the same time, later, this research can be used as material for consideration by a business or the government, especially in making policies to optimize the investment in Indonesia in the future for the country's progress and the welfare of the society. This result is also reinforced by Goodell (2020), who states the direct and indirect impact of COVID-19 on the financial market economy and institutions. This condition has never happened before, causing widespread and even damage to the global economy in every sector; not only the economy but investment has been affected by this pandemic, and its negative impacts continue. Goodell's (2020) argument, stating the ongoing impact of the COVID-19 pandemic on the economy, is undoubtedly different from the conditions that occur based on the data in Figure 1.

Therefore, the writers think investment conditions will move quickly after the pandemic because interest rates, inflation, labor force, gross domestic product, and exchange rate influence them. The labor force factor supports the increase in investment; when the total labor force is higher, the investment will also increase (Nguyen, 2021). The level of investment is also related to the exchange rate; when the exchange rate strengthens against foreign currencies, this can create enthusiasm for investing (Harchaoui et al., 2005). The changes in interest rates can describe the economic situation, which also affects all macroeconomic variables, such as GDP, inflation, and employment levels (Wuhan et al., 2015). Therefore, interest rates really influence the investment. Investment is essential for future cash flow growth, profitability, and the development of prospects.

Although there has been much research on investment throughout the world or in Indonesia, most of the previous research has focused on companies or the agricultural sector,

like the research of Sánchez et al. (2022), which refers to investment in the agricultural sector in the recovery era after the Covid-19. The research results show that investment in agriculture has proven to be one of the drivers of economic recovery after the Covid-19 pandemic. In addition, the effects of macroeconomic aggregates such as GDP and household consumption are beneficial in foreign loans. The previous research by Budiono and Purba (2023) found that electrical energy, clean water, and HDI positively influence investment.

Research by Huyen (2015) explains the factors that influence investment in Vietnam, which are two factors that are becoming of great interest to international business partners: economic and marketing factors and infrastructure factors. In addition, provinces with friendly political or legal factors and the availability of resources and financial factors can attract more foreign investors. Furthermore, research by Miškinis & Sakalauskaitė (2014) explains the main factors that determine FDI in Russia: market size, large cities' presence, oil and gas resources, and political and legislative risk factors.

Therefore, this research differs from the previous ones (Budiono & Purba, 2023; Sánchez et al., 2022; Huyen, 2015; Miškinis & Sakalauskaitė, 2014). The new thing is that this research uses different variables from the previous ones, including the variables of exchange rate, interest rates, inflation, GDP, and labor force. Huyen (2015) proves that financial factors such as the exchange rate significantly affect investment in Thanh Hoa province, Vietnam. Then, this research includes the labor force variable that has not been studied much by the previous research to test whether the labor force factor also influences investment in Indonesia after the pandemic. Then, the method used is also different, using a model that is not widely used to analyze the investment, the Nonlinear Autoregressive Distribution Lag (NARDL) model.

This research aims to find the relationship between interest rates, inflation, labor force, GDP, and the exchange rate with investment in Indonesia after the COVID-19 pandemic. In addition, it is also used to model the asymmetric relationships among the variables and to differentiate between the short-run and long-run effects of independent variables. Later, this research can be used by policymakers, especially the government or business people, regarding the determining factors that must be considered in increasing investment in Indonesia after the COVID-19 pandemic. Afterward, the research can provide specific insight into the dynamics of foreign direct investment in Indonesia after the COVID-19 pandemic. Understanding the determinants of foreign direct investment in Indonesia can also provide an overview of the factors that influence the investment and can help Indonesia recover its economy to develop more quickly after the COVID-19 pandemic and in the future.

## METHODS

This quantitative research uses an econometric approach, using time series data. The research uses secondary data from the World Bank in Indonesia from 1980 to 2022, with 32 observations used. Then this research uses Nonlinear Autoregressive Distributed Lag (NARDL) analysis that has been updated by (Pesaran & Shin, 2012). The NARDL model tests asymmetric relationships of variables observed in the long run. The NARDL model

has the advantage of detecting the asymmetric effects that the independent variable can have on the dependent variable.

This model helps to determine whether the independent variables, which are interest rates, inflation, GDP, labor force, and exchange rates, can attract the foreign investment. The model is developed as follows:

$$INV_t = \beta_0 + \beta SB + \beta KURS + \beta PDB + \beta INF + \beta AK + \varepsilon \quad (1)$$

Description:

INV : Investment

SB : Interest rate

KURS: Rupiah exchange rate

PDB : Gross Domestic Product

INF : Inflation

AK : Labor force

$\beta$  : Constanta

$\varepsilon$  : Error terms

Equation (1) can be modified based on the NARDL model so that it is expanded into an asymmetric long-run equation. Due to non-linearity in the time series, the model is extended to make a space for asymmetric relationships. In the situation where time series are co-integrated, asymmetry and structural damage may occur in the data. The asymmetric NARDL model incorporated in the extended version of the ARDL model is determined as follows:

$$INV_t = \beta^+ SB_t^+ + \beta^- SB_t^- + \beta^+ KURS_t^+ + \beta^- KURS_t^- + \beta^+ GDP_t^+ + \beta^- GDP_t^- + \beta^+ INF_t^+ + \beta^- INF_t^- + \beta^+ AK_t^+ + \beta^- AK_t^- + \varepsilon_t \quad (2)$$

Where  $\beta^+$  and  $\beta^-$  represent long-run parameters, NARDL applies decomposition of the independent variables into positive and negative partial amount for increases and decreases. Asymmetric effects of variables with positive changes such as  $SB^+$ ,  $KURS^+$ ,  $GDP^+$ ,  $INF^+$ , and  $AK^+$  as well as negative changes in  $SB^-$ ,  $KURS^-$ ,  $GDP^-$ ,  $INF^-$ , and  $AK^-$ . Then it is expanded into the following formula:

$$\begin{aligned} SB_t^+ &= \sum_{i=1}^t \Delta SB_t^+ = \sum_{i=1}^t \max(SB_t, 0) \\ SB_t^- &= \sum_{i=1}^t \Delta SB_t^- = \sum_{i=1}^t \min(SB_t, 0) \\ KURS_t^+ &= \sum_{i=1}^t \Delta KURS_t^+ = \sum_{i=1}^t \max(KURS_t, 0) \\ KURS_t^- &= \sum_{i=1}^t \Delta KURS_t^- = \sum_{i=1}^t \min(KURS_t, 0) \\ GDP_t^+ &= \sum_{i=1}^t \Delta GDP_t^+ = \sum_{i=1}^t \max(GDP_t, 0) \\ GDP_t^- &= \sum_{i=1}^t \Delta GDP_t^- = \sum_{i=1}^t \min(GDP_t, 0) \\ INF_t^+ &= \sum_{i=1}^t \Delta INF_t^+ = \sum_{i=1}^t \max(INF_t, 0) \\ INF_t^- &= \sum_{i=1}^t \Delta INF_t^- = \sum_{i=1}^t \min(INF_t, 0) \\ AK_t^+ &= \sum_{i=1}^t \Delta AK_t^+ = \sum_{i=1}^t \max(AK_t, 0) \\ AK_t^- &= \sum_{i=1}^t \Delta AK_t^- = \sum_{i=1}^t \min(AK_t, 0) \end{aligned}$$



Equation (2) can be written in the form of infinite error correction as presented by Pesaran et al. (2001)

$$\begin{aligned}
 \Delta INV_t = & \alpha_0 + \alpha_1 INV_{t-1} + \alpha_2 SB^+_{t-1} + \alpha_3 SB^-_{t-1} + \alpha_4 KURS^+_{t-1} + \alpha_5 KURS^-_{t-1} \\
 & + \alpha_6 GDP^+_{t-1} + \alpha_7 GDP^-_{t-1} + \alpha_8 INF^+_{t-1} + \alpha_9 INF^-_{t-1} + \alpha_{10} AK^+_{t-1} + \alpha_{11} AK^-_{t-1} \\
 & + \sum_{i=1}^t \rho_{1i} \Delta INV_{t-1} + \sum_{i=1}^t \rho_{2i} \Delta SB^+_{t-1} + \sum_{i=1}^t \rho_{3i} \Delta SB^-_{t-1} + \sum_{i=1}^t \rho_{4i} \Delta KURS^+_{t-1} \\
 & + \sum_{i=1}^t \rho_{5i} \Delta KURS^-_{t-1} + \sum_{i=1}^t \rho_{6i} \Delta GDP^+_{t-1} + \sum_{i=1}^t \rho_{7i} \Delta GDP^-_{t-1} + \sum_{i=1}^t \rho_{8i} \Delta KURS^+_{t-1} \\
 & + \sum_{i=1}^t \rho_{9i} \Delta KURS^-_{t-1} + \sum_{i=1}^t \rho_{10i} \Delta GDP^+_{t-1} + \sum_{i=1}^t \rho_{11i} \Delta GDP^-_{t-1} + \sum_{i=1}^t \rho_{12i} \Delta INF^+_{t-1} \\
 & + \sum_{i=1}^t \rho_{13i} \Delta INF^-_{t-1} + \sum_{i=1}^t \rho_{14i} \Delta AK^+_{t-1} + \sum_{i=1}^t \rho_{15i} \Delta AK^-_{t-1} + \mu t
 \end{aligned} \tag{3}$$

Equation (3) regulates the inclusion of short-run and long-run coefficients in the error correction model. The short-run coefficient is represented by the variable  $\Delta$ . And the long-run one is the variable  $\alpha$ . This equation is based on the NARDL model and it assumes an asymmetric relationship among variables.

The first step is to carry out a data stationarity test. This test is conducted to see whether the data is in equilibrium or disequilibrium condition (Shin et al., 2012). The stationary test uses the Augmented Dickey Fuller (ADF) and Philip Perron (PP) models. In this test the data is said to be stationary if the calculated t-value for the ADF and PP statistical values is greater than the critical t-value, otherwise the data is not stationary. Second, estimation is carried out using the OLS method, which is used to eliminate the significant lags. Third, testing the long-run relationship of the independent variable to the dependent variable, which is called the co-integration test. In the co-integration test uses the Wald test, in which the F-critical value in the co-integration test is the F-critical table by (Pesaran et al., 2001). The co-integration test is accepted if the F-statistic value is greater than the F-table -I bound upper. If the F-statistic value is smaller than the F-table -0 bound lower, there is no co-integration. If the F-statistic value is at the upper and lower bound values, there is no decision in that matter (Pesaran et al., 2001).

Afterwards, if the co-integration test results are significant, the next step is to carry out an asymmetric test. The null hypothesis of the asymmetric  $H_0: \sigma_3 = \sigma_4$  alternative hypothesis  $H_a: \sigma_3 \neq \sigma_4$  the null hypothesis of the short-term asymmetry  $H_0: \alpha_3 = \alpha_4$ , the alternative hypothesis  $H_a: \alpha_3 \neq \alpha_4$  are both tested using the Wald test (Pesaran & Shin, 2012). If it turns out that an asymmetric effect is found, there will be an increase or decline in interest rates, inflation, labor force, GDP, and exchange rate against the investment.

## RESULTS AND DISCUSSION

Much research discusses investment, such as the study conducted by Malefane (2007). However, only a little research discusses investment conditions after the COVID-19 pandemic and the role of labor force factors on investment. This research is used to predict the relationship between interest rates, inflation, GDP, labor force, and exchange rates on investment after the Covid-19 pandemic. Apart from that, it is also to model asymmetric relationships between variables to differentiate between

the short-term and long-term effects of independent variables. This research is also different from previous research in that the analysis of this research uses the NARDL (Nonlinear Autoregressive Distributed Lag) method, which has yet to be widely used in investment research.

The first step in the NARDL model analysis is to test the stationarity. Before testing the NARDL model, the data must be stationary at the level stage or at the first difference. If the data turns out stationary at the second difference, the NARDL model cannot be carried out. Researchers use the unit root test to obtain the stationary data results in this stationarity test. This research uses the Phillips-Perron standard and Augmented Dickey-Fuller (ADF) for the stationary test. The result of the stationary test is shown in Table 1.

Table 1. Stationarity Test

Variables	Augmented Dickey Fuller		Phillips-Perron	
	Level	1 <sup>st</sup> Differ.	Level	1 <sup>st</sup> Differ.
Investment	0.2190	0.0002	0.1741	0.0002
Exchange Rate	0.0001	0.1067	0.0001	0.0000
Interest Rate	0.6654	0.0000	0.6944	0.0000
Inflation	0.0020	0.0979	0.0019	0.0001
GDP	0.9924	0.0026	0.9898	0.0026
Labor Force	0.7010	0.0042	0.4618	0.0463

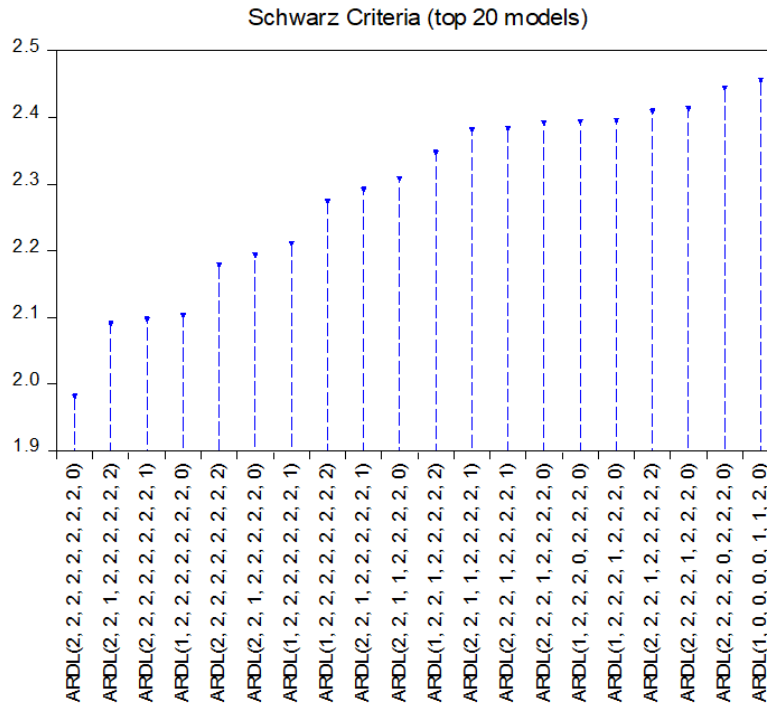
Source: Data processed (2023)

Based on the research results of the unit root testing that has been conducted, which is shown in Table 1, it is noted that the exchange rate and inflation have been stationary at this level. Meanwhile, investment, interest rates, GDP, and labor force are stationary at the first difference level. Therefore, none of the data is stationary at the second difference level, so the NARDL model test can be used and carried out to test the asymmetric relationship of interest rates, inflation, GDP, labor force, and exchange rates with the investment in Indonesia after the Covid-19 pandemic. The following results from the optimum lag determination test can be seen in Figure 2.

The following testing step is determining the best NARDL model using the Schwarz criteria. A good NARDL model can be conducted by comparing the Schwarz Criteria values of the NARDL model. Based on the number of lags used for each model, the testing conducted produces the best NARDL model in the research, shown in Figure 2. It can be seen in Figure 2 that the horizontal axis represents the NARDL model, and the vertical axis represents the SC model. The optimal and ideal NARDL model is the one with the smallest or lowest SC value. According to Figure 2, the best model is (2,2,2,2,2,2,2,0) with an SC value of 1.98.



Figure 2. Results of Optimum Lag Determination (Best Model) Using Criteria



Source: Data Processed, 2023

Another crucial aspect of our research is the co-integration test. This test is not just a formality but a necessary step to understand the relationship among the variables. If there is no co-integration relationship in the analysis, this method model cannot be used. The testing uses the Wald test and is compared with the Bound table. The data can be said to be co-integrated if the F-statistic value is greater than upper I(1). Meanwhile, if it does not contain co-integration, the F-statistic value in the Wald test is smaller than lower I(0). The following results of co-integration testing conducted using the Wald test (see Table 2).

Table 2. Co-integration Test

F-stat	Bound Table	
	I(0)	I(1)
3.484	2.11	3.15

Source: Data Processed (2023)

Table 2 shows the results of the co-integration test, where the F-statistic value is 3.483891, the Bound I(0) table is 2.11, and I(1) is 3.15. These results can explain that the model has a co-integrated relationship, which means that the asymmetric influence of the exchange rate, GDP, interest rates, labor force, and inflation on the investment in Indonesia has a long-run co-integration relationship because the F-statistic value is greater than the upper bound value I(1).

Our research methodology involves applying the NARDL model, chosen for its ability to describe the relationship between the investment variable and independent variables. The NARDL model estimation is used to predict the short-run and long-run relationships of the proposed variables, which are interest rates, inflation, GDP, labor force, and exchange with investment in Indonesia post-COVID-19. Symbol (D) denotes changes in variables in the short run. The estimation results of the NARDL model are presented in Table 3.

Table 3. Estimation Results of Long-Run and Short-Run of NARDL Model

	Variable	Coefficient	Standard error	Prob
Short Run	C	-26.63916	10.12251	0.0581
	AK	2.18E-07	1.14E-07	0.1274
	DSB+	-0.002040**	0.00066	0.0365
	DSB-	0.002759	0.00219	0.2762
	DKURS+	-0.315681*	0.115741	0.0526
	DKURS-	-0.690478***	0.138499	0.0076
	D(GDP)	-1.30E-11	7.64E-12	0.1645
	DGDP(t-1)	1.83E-11*	6.70E-12	0.0524
	DINF+	-0.255853**	0.066875	0.0187
	DINF-	0.640065**	0.212948	0.0397
Long Run	KURS-	-0.343521**	0.087855	0.0174
	INF-	0.826085	0.392933	0.1034
	PDB	6.20E-12	6.27E-12	0.3785
	AK	1.71E-70	1.20E-07	0.2270
	SB+	-0.000985	0.000501	0.1270
	<b>Diagnostic Test</b>			
	R <sup>2</sup>	0.988122		
	Adj R <sup>2</sup>	0.916857		
	ARCH Test		0.8619	
	Normality Test		0.326572	
	Autocorrelation Test		0.3087	

Notes: \*, \*\*, and \*\*\* each represents the significance level 10%, 5% and 1%.

Source: Data Processed (2023)

Our discussion and analysis reveal the output results of short-run and long-run relationships (positive and negative shocks) among the variables, as shown in Table 3. The nonlinear relationship between shocks of the independent variable and the dependent variable can be explained as follows: the short-run NARDL estimation results based on the interest rate show that only changes in interest rate+ have a significant impact on the investment. This means that the investment level is stable when facing changes in

interest rates in the short run. Our findings, supported by the work of Karamelikli & Karimi (2022), suggest that the interest rate has no significant coefficient in the short run. However, there are also supporting findings that interest rate+ has a significant effect on investment (Abel & Eberly, 1999). This relationship between interest rate and investment suggests that an increase in the interest rate can also support investment. These findings underscore the importance for the government, as a policy maker, to consider the impact of interest rate increases when planning investment.

The exchange rate variable shows that the exchange rate coefficient has a significant value. These results show that changes in the exchange rate significantly impact foreign direct investment. However, this impact depends on the direction of changes in the exchange rate, where it can be seen that an increase in the exchange rate tends to reduce the investment, while a decline in the exchange rate tends to increase the investment. The following research by Bahmani-Oskooee et al. (2018) shows that the exchange rate is indeed experiencing changes in the effects of short-term asymmetries on investment. These findings have important implications for economic and policy decision-making. This research can help the government and the policymakers to consider changes in the exchange rate when planning investment policies in the short run. In addition, the government needs to be able to monitor changes in the currency exchange rate in the investment strategies.

The inflation variable shows that the inflation+ coefficient has a significant value. These results indicate that short-run inflation significantly impacts investment. An increase in inflation tends to reduce the investment, while a decrease in inflation can increase the investment. It requires the appropriate policy efforts so that the government can use this research as material to consider the impact of changes in inflation in planning investment policies in the short run. The results of the research are in line with the research by Valadkhani et al. (2009) and (Kamasa et al. (2022), which have a negative influence on investment. The research results provide insight into when a higher inflation rate can cause a decline in the total output. When inflation occurs, it will cause prices to soar so that people's purchasing power will decrease. When people's purchasing power decreases, it will affect the company profits, which will also decrease. This condition makes the investors reluctant to invest because the results will be less. This result means higher investment growth can only occur if the government controls inflation.

The GDP variable shows that the GDP coefficient is not significant. This result means that current GDP growth (GDP) does not significantly impact investment, while GDP growth in the previous period  $GDP(t-1)$  significantly impacts in the short term. The findings in this research follow research by Akter and Rahman (2023), which states that GDP is a significant determining factor in FDI. However, this research is different from the research conducted by Fathia et al. (2021), which shows that the GDP variable positively affects foreign direct investment. Special attention is required to the impact of previous GDP growth on investment. In addition, the current GDP variable is not a significant factor in determining the investment level after the Covid-19 pandemic.

Then, the labor force variable shows that the labor force is not statistically significant, which means that changes in the labor force do not significantly impact investment in the short run. The labor force variable is not the dominant factor determining investment in the short run. This research differs from the results of Akter & Rahman (2023), showing that the labor force and FDI have a significant positive relationship. However, this finding was made by Pratama et al. (2016), whose research results show that the individual labor force is not significant but has a positive influence. This condition can happen because of the number of labor forces in Indonesia; not all meet the requirements that foreign companies or investors seek according to their wishes. Therefore, the labor force variable does not significantly impact the investment.

Then, the long-run results of NARDL can be seen in Table 3, showing that only the exchange rate- variable is significant for the investment, which means that when there is a 1% increase in the exchange rate-, the investment will experience a decline of 34.35%. Exchange rates have an important role in the global economy. Changes in currency exchange rates can affect the competitiveness of a country's exports and imports, as well as foreign direct investment and capital flows. In the long run, only the exchange rate variable is significant. This result could happen because the exchange rate can affect import costs, export product prices, and economic stability. These findings differ from those of previous researchers, such as Khatabi et al. (2020) and Williams et al. (2022), who state that when the exchange rate increases, it also causes an increase in foreign direct investment. However, research by Hniya et al. (2021) consistently strengthens the author's findings, explaining that FDI has a negative relationship with exchange rates. In the long run, the exchange rate tends to reduce the investment. An investor will undoubtedly prefer to invest in a stable economy.

Meanwhile, other variables such as inflation, labor force, GDP, and interest rates do not significantly affect investment in the long term. This result means that inflation has little effect on investment in the long term. Research conducted by Alshamsi et al. (2015) and Sari et al. (2023) revealed that inflation has a positive and insignificant effect on investment. The results of foreign direct investment show that inflation is not an obstacle to entering foreign direct investment. Therefore, inflation does not directly influence investors' interest in making foreign direct investments. Because the majority of people still have trust and access to money. Inflation in Indonesia is relatively low compared to other countries because consistent price components support it.

The labor force shows a positive value but not significant. This result means that the labor force influences investment in the long term. This result is based on research by Okşak and Koyuncu (2021), which shows that there is no significant relationship between investment and the labor force. Based on macroeconomic theory, the labor force can be a potential source of labor for investment. However, this theory also explains that other factors can influence the relationship between the labor force and investment, such as the level of education or skills. GDP does not have a significant influence on investment in the long term. This result is from Barro &

Sala-i-Martin's (1990) research, which followed the theory that GDP only significantly influences investment in the short term. Meanwhile, in the long term, investment is more influenced by other factors that are not researched, such as political stability and economic policy.

The results of long-term estimation show that interest rates do not significantly influence investment in the long term. This research supports the findings of Fahmi & Septiani (2023), where the results of this research interest rates have an insignificant effect. This research can affect investment because the higher interest rates in a country will cause investors to invest less capital, or it will affect the amount of investment, which will decrease. Based on the theory, loans will become more expensive when interest rates rise, affecting the project. However, if interest rates fall, borrowing costs will be cheaper, and more investor projects and developments will occur.

**Table 4. Asymmetric Test Using Wald Test**

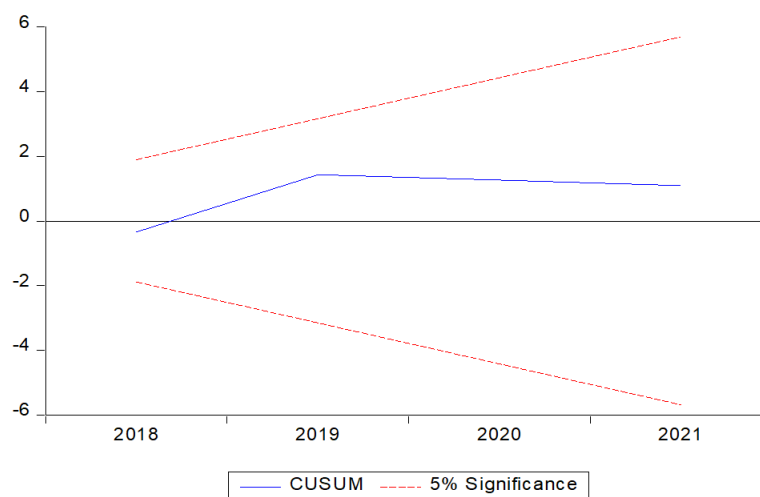
Variables	Coefficient	Std. Error
Interest Rate	0.012711**	0.011493
Exchange Rate	0.012533**	0.007293
GDP	0.012150**	0.012675
Inflation	1.964.485	1.286.121
Labor Force	2.345.117	2.343.362

Notes: \*\*, \* and \*\*\* each represents significance level 10%, 5% and 1%.  
Source: Data processed, 2023

In the diagnostic test results in Table 3, the model's goodness is explained by the R2 value of 0.988122 and the adjusted R2 of 0.916857. This result is evidence of the dependent variable (investment) that can be explained by the independent variables (exchange rate, interest rates, inflation, GDP, labor force) by 98.8 percent. Then, there are several diagnostic tests to ensure and confirm that the NARDL model used in this research is valid and the best model. The classical assumption test is conducted, which consists of the ARCH test to test for heteroscedasticity, normality test, and LM to test autocorrelation. This condition can be seen at the end of the table, where the results show that this research is free from all classical assumptions and problems. After obtaining the classical assumption test, it can be continued with the following analysis, the Wald test, shown in Table 4.

The Wald test results in Table 4 show that there is a significant long-run asymmetric relationship among the variables for the exchange rate, GDP, and interest rate, where there is a long-run asymmetric influence between the exchange rate, GDP, and interest rate variables on the investment in Indonesia after the Covid-19 pandemic. Meanwhile, there has been no long-run asymmetric influence on investment for the inflation and labor force variables since the COVID-19 pandemic in Indonesia.

The next step is testing the stability of the NARDL model, which is applied in this research by testing the CUSUM test. This test is used to determine whether the model under the research is stable. The image below shows the results of the cusum test, which displays the blue line between the significance lines (red line). Based on the results of the cusum test, the blue line is still between the two red lines with a significance level of 5%. This result means that the model in this research is stable and can also be used to explain long-run co-integration. The CUSUM test results are shown in Figure 3.



Source: Data Processed (2023)

## CONCLUSION

Investment is a determining factor that influences Indonesia's economic growth. More detailed studies and knowledge of foreign direct investment are necessary for a country's economic development, especially in Indonesia. This research uses the NARDL method to determine the asymmetric effects of foreign direct investment determinants. This research has five variables: interest rates, inflation, GDP, labor force, and exchange rate. The NARDL model estimation results find long-run asymmetric effects of exchange rates, GDP, and interest rates on investment in Indonesia after the COVID-19 pandemic, while there is no influence on the inflation and labor force variables.

Meanwhile, the short-run NARDL estimation results show that interest rates, exchange rates, and inflation significantly affect investment after the COVID-19 pandemic. In contrast, the GDP variable currently does not significantly impact investment, nor does the labor force variable. There are changes in the labor force, but they do not significantly impact investment. The research results may occur due to the existing limitations and other factors influencing the investment.

The results of this research can be a beacon of hope for the parties involved in foreign direct investment, especially the government in Indonesia. They can use these results to create policies that can better optimize investment, thereby bolstering economic growth



in Indonesia. The information from NARDL's estimation results regarding investment determinants can be used as a benchmark for understanding the potential impact of investment determinants when they increase or decrease. This can guide future research to add other variables or use other methods to test the latest updates and uncover more about the investment phenomenon in Indonesia. Moreover, other countries can also use this research as a reference or compare the investment conditions in their own countries, fostering a sense of global collaboration and shared progress.

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