Journal of Economics, Business, & Accountancy Ventura Vol. 24, No. 2, August – November 2021, pages 258 - 270

What Determines Foreign Direct Investment in Indonesia?

Euis Eti Sumiyati

Universitas Jenderal Achmad Yani, Cimahi, Jawa Barat, Indonesia

A R T I C L E I N F O

Article history:
Received 16 July 2021
Revised 29 October 2021
Accepted 26 November 2021

JEL Classification:
E22, E62, F21

Key words:
FDI, GDP, Inflation, Exchange Rate, ARDL

DOI:
10.14414/jebav.v24i2.2721

A B S T R A C T

This study examines the determinants of foreign direct investment (FDI) in Indonesia's manufacturing sector. This study uses time-series data observations, starting from the 1st quarter of 2010 to the 4th quarter of 2020. The data analysis method employed was Autoregressive Distributed Lag (ARDL) cointegration approach. The research results showed that the exchange rate and GDP growth positively affected FDI inflows in the long run, while inflation hurt FDI inflows. Gross fixed capital formation did not significantly affect the FDI inflows in the manufacturing sector. This research implies that the government must create or develop policies related to foreign direct investment to benefit economic development in Indonesia. The government's efforts to control inflation have to be strengthened continuously by maintaining the availability of supply and distribution of goods. Supply continuity and smooth distribution between regions must be improved by utilizing information technology and strengthening inter-regional cooperation. Likewise, efforts to increase economic growth have to continue to be improved by providing incentives or facilities to companies at various levels, both export-oriented and those focusing on domestic sales.

A B S T R A K

Penelitian ini bertujuan untuk mengkaji faktor-faktor penentu investasi asing langsung di sector manufaktur Indonesia. Penelitian ini menggunakan data deret waktu sebanyak 40 buah observasi mulai dari kuartal pertama 2010 hingga kurtal keempat 2020. Metode analisis data yang digunakan adalah Autoregressive Distributed Lag (ARDL) cointegration approach. Hasil penelitian ini adalah bahwa dalam jangka panjang, nilai tukar dan pertumbuhan ekonomi memiliki efek positif pada arus masuk investasi asing langsung, sementara inflasi memiliki efek yang negatif pada arus masuk investasi asing langsung. Pembentukan modal tetap bruto tidak memiliki efek pada arus masuk investasi asing langsung di sektor manufaktur. Implikasi penelitian ini adalah pemerintah harus membuat atau mengembangkan kebijakan-kebijakan yang berkait dengan investasi asing langsung yang memberi manfaat untuk pembangunan ekonomi di Indonesia. Upaya pemerintah untuk mengendalikan inflasi harus terus diperkuat dengan menjaga ketersediaan pasokan dan distribusi barang. Kesinambungan pasokan dan kelancaran distribusi antar daerah harus lebih ditingkatkan melalui pemanfaatan teknologi informasi dan penguatan kerjasama antar daerah. Demikian pula upaya peningkatan pertumbuhan ekonomi harus terus ditingkatkan dengan memberikan insentif atau fasilitas kepada perusahaan di berbagai level, baik yang berorientasi ekspor maupun yang fokus pada penjualan domestik.

1. INTRODUCTION

Over the decades, most countries worldwide have made their business investment environment friendly for attracting more foreign direct investment (FDI) into their countries. FDI has been known as a key source of income, capital flows, business competition, innovations, job creations, technological transfer, which are important processes of economic development (Xaypanya, 2015). Based on the ASEAN Investment Council report, some member countries of the Association of Southeast Asian Nations (ASEAN) have attracted FDI through various policies (Kaliappan et al., 2015). In the case of Indonesia, the FDI policies include

** Corresponding author, email address: euis.eti@lecture.unjani.ac.id*

offering qualified investors 100% foreign-equity ownership in wholesale and retail trading, manufacturing, and bank sector, as well as the reduction of the processing time for the approval of investments of less than US$100 million to ten working days.

The Indonesian FDI inflows tended to decline over time, and the largest decline occurred during the 2019-2020 period, 57.7 percent. The decline was in line with the COVID-19 pandemic marked by a decline in economic growth by 2.07%. Negative FDI growth occurred in all sectors, including the agricultural sector, mining and quarrying sector, processing industry, electricity, gas, water, and construction sector. The largest decline occurred in the agricultural sector, which declined by 106%, followed by the manufacturing sector, which declined by 58.3%, the construction sector, which by 56.1%, the mining and quarrying sector, which declined by 31.4%, and the electricity, gas, and water sector, which declined by 28.9% (Bank Indonesia, 2020). This reduced flow of the Indonesian FDI will further reduce the production activities and the development of the Indonesian economy.

The manufacturing sector dominated the Indonesian FDI inflows based on the sectoral FDI data distribution. The average distribution of FDI in the manufacturing sector during the 2010-2018 period reached 67.4%. The second-largest contributor was the agricultural sector at around 20.8%, followed by the mining and quarrying sectors at 7.7%, the electricity, gas, and water sector at 2.6%, and the construction sector at 1.4%. During the COVID-19 pandemic in 2019-2020, the manufacturing sector still occupied the highest position with an average FDI distribution of 61.5%, followed by the mining and quarrying sector at 14.8%, the electricity, gas, and water sector at 12.2%, the construction sector at 6.8%, and the agricultural sector by 4.8% (Bank Indonesia, 2020). The manufacturing sector is a priority sector because the government has targeted the Making Indonesia 4.0 roadmap, which by 2030 will return the net export figure to 10%. Five manufacturing sectors are prioritized for development into the industrial revolution 4.0 era and will be encouraged to export actively. Those five sectors are the textile and clothing industry, the automotive industry, the food and bever-age industry, the electronics industry, and the chemical industry (Sumiyati, 2020).

Since the role of FDI in the manufacturing sector in the Indonesian economy is important, it is essential to identify the factors that can influence FDI in the manufacturing sector in Indonesia. This research refers to location advantage as an observable variable, especially economic profit as one of the factors that can attract FDI to a country. These economic variables include inflation, exchange rates, economic growth, and gross fixed capital formation. Exchange rate and inflation variables can be considered investors' motives in terms of efficiency-seeking, while GDP growth can be considered market-seeking (Xaypanya, 2015). Likewise, the gross fixed capital formation variable can potentially attract FDI to a country because it shows the capital stock and the infrastructure readiness in the host country (Danish & Akram, 2014).

The results of the study by Asiamah et al. (2019), Danish & Akram (2014), Ngo et al. (2020) showed that inflation had a significantly negative effect on FDI inflows. However, Asongu et al. (2018), Aziz & Mishra (2015), Canh et al. (2020), Hailu (2009), Jaiblai & Shenai (2019), and Vijayakumar et al. (2010) showed that inflation did not affect FDI inflows. In addition, Abdulmohsen & Bel (2020), Asiamah et al. (2019), Aziz & Mishra (2015), Canh et al. (2020), and Cuyvers et al. (2011) proved that the exchange rate had a positive effect on FDI inflows. On the other hand, Chiappini (2014), Jaiblai & Shenai (2019), Tsen (2005), Vijayakumar et al. (2010), and Xaypanya, 2015) found that the real exchange rate had a negative effect on FDI inflows. Next, re-search by Gomes et al. (2013) investigated the FDI determinants in Brazil and Mexico stated that the exchange rate did not have any effect on FDI in Brazil but had a positive effect in Mexico. Market growth rate factor (GDP growth), as one of the determinants of FDI, was examined by Aziz & Mishra (2015) and Canh et al. (2020), was found to affect FDI positively. Meanwhile, Mahmood & Alkhateeb (2018) showed that GDP growth did not affect FDI. Last, Danish & Akram (2014 proved that gross fixed capital formation had a positive effect on FDI inflows. On the other hand, Vijayakumar et al. (2010) stated that gross fixed capital formation affected FDI negatively. Meanwhile, Ranjan (2011) showed that gross fixed capital formation did not affect FDI.

Based on the exposure of the results of previous studies, it can be seen that there are various conclusions from the factors that affect FDI inflow. In addition, from several previous studies, the coverage is at the state and non-sectoral levels. This is a gap to conduct sectoral research. The sector chosen in this study is the manufacturing sector because this sector has the most significant impact on the economy. Furthermore, the problem with this

research is that during the 2010-2020 period, FDI growth in the manufacturing sector tends to decline, even though the government has carried out various efforts to attract FDI. In addition, the manufacturing sector is a sector that dominates FDI inflows in Indonesia, as explained in the initial section of the introduction.

The study of the factors determining FDI flow in the manufacturing sector seems to be an interesting topic. Chiappini (2014) explored the relationship between six governance indicators and outward FDI in the Jap-anese manufacturing industry by estimating the FDI gravity model in 30 host countries from 2005 to 2011. Tsen (2005) looked at the long-term link between FDI and the factors that influenced it in Malaysia's manufacturing industry from 1980 to 2002 using the Johansen cointegration method. Michalíková & Galeotti (2010) examined the determinants of FDI in the Czech Republic's manufacturing industry in the period 2000-2007. Similarly, Liu & Daly (2011) analyzed the FDI inflows' main determinants in low-tech and high-tech manufacturing industries across three geographic regions in China.

Based on the explanation above, the purpose of this study is to examine the impact of inflation, exchange rate, GDP growth, and gross fixed capital formation on FDI inflows in the manufacturing sector. The Autoregressive Distributed Lag (ARDL) model, which is a dynamic model in econometrics, is used to investigate the factors that determine FDI inflow in the manufacturing sector. ARDL is a model that includes the dependent variable's past values (lag) among the explanatory variables. Regression models that include variable values that explain the present value or past value (lag) of the dependent variable as one of the explanatory variables are called Autoregressive Distributed Lag (Gujarati & Porter, 2009). One of the previous researchers who used the ARDL model was (Mahmood & Alkhateeb, 2018), researching FDI and Domestic Investment in Saudi Arabia.

2. THEORETICAL FRAMEWORK AND HYPOTHESES

The international capital movement of firms through the formation or expansion of other companies in other nations is known as a foreign direct investment (Sasana & Fathoni, 2019). Foreign direct investment (FDI) involves the purchase of factories, capital goods, land, and inventories by a foreign company. Both capital and management are engaged in this scenario, and the investor retains control over the invested funds. FDI often takes the form of a business forming a subsidiary or assuming control of another company. In an inter-national context, multinational corporations involved in manufacturing, resource exploitation, and services are the most common subjects of FDI. The United Nations Conference and Development (UNCTAD) defines FDI as an investment that reflects the lasting interest and control by foreign investors in companies located in the investment destination country (foreign affiliates). FDI inflows consist of foreign investors' capital con-tributed to related companies or capital acquired from affiliated companies by foreign investors. Thus, it can be said that FDI aims at controlling the company's operations in the investment destination country.

There are nine theoretical models on FDI determinants (Faeth, 2009). These cover the discussion of the preliminary study findings on FDI determinants. The FDI determinants are based on neoclassical trade theory, benefits to owning a business, aggregate variables, the framework for ownership, location, and internalization advantage, horizontal and vertical FDI models, the knowledge capital model, and risk diversification varied FDI models and policy variables. Any study of the factors that influence FDI should not be limited to a particular theoretical paradigm. Instead, a mix of aspects from many theoretical models should be utilized to explain FDI more broadly, such as ownership benefits or agglomeration economies, market size and characteristics, cost considerations, transportation costs, safeguards, risk concerns, and regulatory variables.

However, this research refers to the ownership, location, and internalization advantage framework (Eclectic or OLI Paradigm). This theory was first introduced by Dunning in 1977 (Faeth, 2009). The eclectic theory is adapted to global changes where FDI flows in advanced industrial countries are more concerned with transparent government policies, differences in production costs, availability of infrastructure and skills, political systems, and socio-cultural characteristics of the host country. Meanwhile, FDI flows in developing countries still depend on several determinants such as market size, income level, labor skills, infrastructure, and other resources that can facilitate more efficient production specialization. In summary, FDI is governed by a mix of ownership gains, market size and features, factor costs, transportation costs, protection, and other factors such as regime type, infrastructure, property rights, and industrial conflicts, according to empirical research analyzing the OLI framework (Faeth, 2009).

Economic factors are one of the factors that can attract FDI to a country. These economic variables include inflation, exchange rates, economic growth, and gross fixed capital formation. The exchange rate and inflation variables are included in the investor's motive as efficiency-seeking. Meanwhile, GDP growth and gross fixed capital formation are investors' motives for market seeking.

Inflation is defined as a continual and widespread increase in the price level. Inflation cannot be defined as an increase in the price of one or two commodities unless the increase extends to (and results in an in-crease in) the majority of the prices of other goods. The theory that describes the relationship of inflation and investment, cost-push inflation, can occur due to an increase in production costs, which results in a decrease in aggregate supply. An increase in production costs will also increase prices. This has an adverse effect and weakens the position of creditors, makes access to credit difficult, and hinders the inflows of foreign direct investment funds. The increase in inflation causes people's purchasing power to decrease. In addition to the declining purchasing power of the people, inflation can also cause the level of risk of business failure to in-crease, which in turn makes domestic investment less attractive.

Several findings from previous studies on the impact of inflation on FDI showed different results. Some researchers proved that inflation had a significant negative effect on FDI inflows (Asiamah et al., 2019; Danish & Akram, 2014; Ngo et al., 2020). Several other studies showed that inflation did not affect FDI in-flows (Asongu et al., 2018; Aziz & Mishra, 2015; Jaiblai & Shenai, 2019; Vijayakumar et al., 2010). In addition, Chiappini (2014) showed that inflation in developed countries had a significant negative effect on Japan's FDI outflow, while inflation in developing countries did not affect Japan's FDI outflow.

The exchange rate, also known as the foreign exchange rate, is the price of one unit of domestic currency expressed in another country's currency. Concerning FDI, Goldberg & Klein (1997) suggest that the exchange rate can affect FDI through two sides, in terms of the total amount of FDI entering the recipient country or in terms of the allocation of FDI spending from home countries. When a country's currency depreciates, the nominal value of that currency has increased, but its value has decreased compared to other countries currencies. This will have a positive effect on FDI inflows in that country. Countries with a depreciating currency value have a location advantage, so it becomes an attraction for foreign investors to increase production efficiency. This attraction arises from workers' wages and production costs which have decreased because the value of the country's currency has depreciated. Depreciation in the currency value can also increase the country's exports of goods. When a country's currency depreciates, the price of that country's exported goods becomes relatively cheaper in the international trade market, with the relatively cheaper price causing the demand for exported goods to increase. The increase in exports will increase the profits earned by investors. This is what attracts investors. Conversely, when the value of a country's currency appreciates (strengthens against currencies of other countries), the price of goods produced by that country is relatively higher in the international market so that the amount of demand for goods for export decreases and affects the profits earned by investors.

Previous studies showed that the exchange rate positively influenced FDI inflows (Abdulmohsen & Bel, 2020; Asiamah et al., 2019; Aziz & Mishra, 2015; Canh et al., 2020; Cuyvers et al., 2011). Meanwhile, some researchers found that the real exchange rate negatively affected FDI inflows (Chiappini, 2014; Jaiblai & Shenai, 2019; Tsen, 2005; Vijayakumar et al., 2010). A study by Xaypanya (2015) examined the factors that determine FDI in Cambodia, Laos, and Vietnam (ASEAN3) and Indonesia, Malaysia, the Philippines, Thailand, and Singapore (ASEAN5) found that exchange rates had a negative effect on FDI inflows. Furthermore, Hoang & Bui (2014) and Gomes et al. (2013 stated that the exchange rate did not affect FDI inflows.

GDP determines the overall market value of a country's finished goods and services generated in a given year. The most important benefit of GDP is to measure the overall performance of an economy. GDP growth has a positive influence on the FDI entry into a country. GDP growth as a proxy for market size reflects the purchasing power of people in investment destination countries. The large market size and continues to in-crease is a conducive condition to increase the demand for goods and services produced by investors, which will enable the achievement of economic scale (Tsen, 2005). Market size and market growth rate are parts of the economy size that can affect FDI inflows. A study by Gomes et al. (2013) found that GDP positively affect-ed FDI inflows in Brazil and Mexico. These results were following the findings of Asiamah et al. (2019, Asiedu (2005), Asongu et al. (2018), Chiappini (2014), Liu & Daly (2011), Ngo et al. (2020), Sharma

& Baby (2019), Tsen (2005) and Vijayakumar et al. (2010) showing a positive impact of GDP on FDI inflows.

Furthermore, Abdulmohsen & Bel (2020) used the ratio of FDI to GDP as an indicator of market size and produced a positive influence of GDP on FDI. This result is in line with Aziz & Mishra (2015) and Canh et al. (2020), who found that GDP growth positively affected FDI inflows. However, Jaiblai & Shenai (2019) and Mahmood & Alkhateeb (2018), using the ARDL method, found that GDP, in the long run, had a negative effect on FDI while it did not affect FDI in the short term.

Another factor that is no less important and can affect FDI inflows is gross fixed capital formation. Gross fixed capital formation is expenditure for capital goods, such as factories, machinery, and equipment. Capital formation is a factor that can increase national income and economic growth. The existence of optimal capital accumulation can lead to improved output and income in the future, resulting in increased economic growth. Danish & Akram (2014) showed that gross fixed capital formation positively affected FDI. On the contrary, Vijayakumar et al. (2010) showed that it had a negative effect on FDI. Meanwhile, Ranjan (2011) found that gross fixed capital formation did not affect FDI.

This research aims at estimating the FDI in the manufacturing sector in Indonesia. The manufacturing sector is involved because the distribution of FDI inflows in Indonesia is dominated by the manufacturing sector, as explained in the introduction above. The variables determined to affect the FDI potentially are inflation, exchange rates, economic growth, the level of economic openness (trade openness), and gross fixed capital formation.

Based on the explanation above, this research aims at estimating the determinants of FDI inflows in the manufacturing sector using the Autoregressive Distributed Lag cointegration approach. The hypothesis in this research is that in the long term, inflation has a negative effect on FDI inflows, the exchange rate has a positive effect on FDI inflows, GDP growth has a positive effect on FDI inflows, and gross fixed capital formation has a positive effect on FDI inflows.

3. RESEARCH METHOD

Several factors that could determine FDI in the manufacturing sector are inflation, exchange rates, GDP growth, and gross fixed capital formation. These variables refer to previous research as described above. The data type used was time-series data (quarterly period) for 11 years starting from 2010 to 2020. The data source was obtained from (Bank Indonesia, 2020). The following is the explanation of the variables studied in this research:

Table 1. Data description

No	Variables	Note	Indicator	Source
1	LN FDI	Inflows of foreign direct investment into the manufacturing industry	Natural logarithm of FDI inflows in the manufacturing sector	
2	Inflation (INF)	Inflation rate	Average quarterly change in the consumer price index (in percent)	Indonesian Economic and Financial Statistics (SEKI), Bank Indonesia
2	Growth of GDP (GRGDP)	Gross Domestic Product Growth based on constant price 2010	Real GDP quarterly change (in percent)	
3	Exchange Rate (LN EXCH)	Exchange rate (USD/rupiah)	Natural logarithm of the average exchange rate	
4	GFCF	Gross Fixed Capital Formation	The ratio of GFCF to GDP (in percent)	

The data analysis method employed was the autoregressive distributed lag (ARDL) method developed by Pesaran et al. (2001). The ARDL model was generally applied in many economic cases. Several previous studies suggested that the dynamic autoregressive distributed lag (ARDL) model is appropriate for analyzing the determinants of FDI (Abdulmohsen & Bel, 2020; Appiah et al., 2019; Jaiblai & Shenai, 2019; Mahmood & Alkhateeb, 2018). In empirical econometrics, the ARDL model proved extremely valuable since it made a static economic theory dynamic by explicitly accounting for the function of time. This model was able to differentiate between the dependent variable's short- and long-term responses to a unit change in the explanatory variable's value. ARDL combines

autoregressive (AR) and distributed lag (DL) methods. AR model is a regression model that contains the dependent variable influenced by the independent variable at *t* time and influenced by the dependent variable itself at *t*-1 time. The distributed lag model is called a dynamic model because the effect of a one-unit change in the value of the independent variable is distributed over several periods (Gujarati & Porter, 2009). The advantage of this ARDL approach is that it produces estimates consistent with the long-term coefficients regardless of whether the explanatory variables or the regressors are static at level 1(0) or at first difference 1(1). However, the ARDL model cannot be used if the data is stationary in the form of a second difference or I(2). Another advantage is that the ARDL model does not consider the small number of samples or observations. However, the requirements must be met. The basic model of FDI inflow estimation can be written as:

$$LNFDIt = \beta0 + \beta1LNEXCHt + \beta2INFt + \beta3GRGDPt + \beta4GFCFt + \varepsilon t \quad (1)$$

where LNFDI is the logarithm of natural foreign direct investment, LNEXCH is the logarithm of the natural exchange rate (USD/Rupiah), INF is inflation, GRGDP is the growth of the gross domestic product, and GFCF is gross fixed capital formation.

From the estimation equation above, the long-term equation (2) and short-term equation (3) in this study can be written as follows (Labibah et al., 2021; Mahmood & Alkhateeb, 2018):

$$LnFDIt = \beta0 + \beta1LnFDIt\text{-}i + \beta2LnEXCHt\text{-}i + \beta3INFt\text{-}i + \beta4GRGDPt\text{-}i + \beta5GFCFt\text{-}i + \varepsilon t \quad (2)$$

$$\Delta \ln FDI = \alpha + \alpha_1 \sum_{i=1}^{p} \Delta LNFDI_{t-i} + \alpha_2 \sum_{i=1}^{p} \Delta lNEXCH_{t-i} + \alpha_3 \sum_{i=1}^{p} \Delta INF_{t-i} + \alpha_4 \sum_{i=1}^{p} \Delta GRGDP_{t-i} + \alpha_5 \sum_{i=1}^{p} \Delta GFCF_{t-i} + \delta ECT_{t-i} + \varepsilon_t \quad (3)$$

where Δ is the difference (change) between two values of a variable in successive periods, α and δ are estimation coefficients, and ECT is the error correction term

The stages of choosing the ARDL method as a data analysis method in this research started from the stationarity test, determining the maximum lag, ARDL cointegration test (bound testing cointegration), diagnostic test (classical assumption test), and model stabilization test (Ekananda, 2018).

Stationarity Test

In time-series data, stationarity is one of the important requirements that must be met. Using non-stationary data into the equation will result in a spurious regression equation (Gujarati & Porter, 2009). One of the formal procedures for testing stationarity was the unit root test. David Dickey and Wayne Fuller developed this test, referred to as the Augmented Dickey-Fuller (ADF) Test. If a time series data was not stationary at the level of (zero-order, I(0)), then the stationarity of the data could be searched through the next order, namely the first-order or I(1) (first difference), or the second-order or I(2) (second difference). Since this research applied the ARDL method, all variables had to be stationary at the level of (I(0)) or first order (I(1)). If this condition was not met, or there was a stationary variable on the second-order (I(2)), it would cause the ARDL method to be invalid to be applied. The hypothesis for this stationarity test was:

H0: there was a unit root (not stationary)

H1: there was no unit root (stationary)

Maximum Lag Determination

The best model estimation from the ARDL approach was done by first setting the maximum lag used in the equation. According to Pesaran et al. (2001), ARDL cointegration testing could use Akaike's information criteria (AIC) to determine the maximum lag. The AIC value was employed to determine the lag-optimum variable. According to Ekananda (2018), the AIC approach provided the closest picture to reality.

ARDL Cointegration Test (Bound-Testing Cointegration)

ARDL cointegration test was used to see the long-term relationship between the dependent variable and the independent variable as developed by Pesaran et al. (2001). The cointegration test hypotheses are as follows:

H0: $\beta_6=\beta_7=\beta_8=\beta_9$ (there was no cointegration in the model)

H1: $\beta_6 \neq \beta_7 \neq \beta_8 \neq \beta_9$ (there was cointegration in the model)

The next step is to compare the F-score value to the lower and upper critical bound values found in research (Pesaran et al., 2001). Critical values for F-statistics could be used for short time-series data as in this research for small sample sizes. The null hypothesis was rejected if the computed F-score was larger than the upper critical bound, indicating cointegration or a long-term connection between the dependent and independent variables in the model. The null hypothesis was accepted if the F-score value was less than the upper critical bound, indicating no cointegration between the dependent and independent variables in the model. If the computed F-score fell between the lower and higher critical limits, the conclusion on whether or not there was cointegration was not conclusive.

If there was a cointegration relationship between the dependent variable and the independent variable in the model, the next step was to estimate the long-term coefficient for the ARDL model. If there was a long-term relationship between variables, then the short-term relationship could be investigated using an error correction model (ECM). To determine the validity of the short-term model, the Error Correction Term (ECT) value, which indicated the speed of adjustment or showed how quickly the variable returns to long-term equilibrium, was employed. The short-term model was valid if the ECT had a statistically significant coefficient and had a negative value.

Diagnostic Test (Classical Assumption Test)

Classical assumption test on ARDL model estimation needed to be done to avoid errors in interpretation and conclusion. The traditional assumption test was a statistical criterion that had to be satisfied using multiple linear regression with Ordinary Least Squares (OLS). Several classical assumption tests had to be met by the model to become a good and unbiased estimator or commonly referred to as BLUE (Best Linear Unbiased Estimator). A regression model is BLUE if the residuals are normally distributed and have no heteroscedasticity. The regression model must meet the assumption that the residual variance of each independent variable has a constant value or has the same variance. Another basic assumption is that the model does not contain autocorrelation in the residual value, or each residual value does not depend on the residual value before and after (Ekananda, 2018). Therefore, the classical assumption test used in this study included the residual normality test, autocorrelation test, and heteroscedasticity test.

Model Fit Test (Goodness of Fit Test)

The goodness of fit of the ARDL model could be seen through stability tests such as the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ). A stability test was used to detect the stability of parameters in the long term and short term. Pesaran et al. (2001) argue that CUSUM and CUSUMSQ were good tests to examine the stability of the model. The significant CUSUM graph at the 5% confidence level indicated the stability of the parameter.

4. DATA ANALYSIS AND DISCUSSION

This section showed the research results that include the results of the stationarity test, the determination of the maximum lag, the cointegration test (bound testing cointegration), the error correction term test, the clas-sical assumption test of the regression, and the stability test of the model.

Stationarity Test Results (Unit Root Test)

The ARDL method required that the data be stationary at level I(0) or at the first difference level I(1) and en-sure that the data used was not stationary at the second difference level. The data stationarity test was carried out using the Augmented Dickey-Fuller (ADF) method. The results showed that the five data were stationary at the first difference level. Thus, the ARDL method could be used since the requirements were met. Station-arity test results are presented in Table 2 below:

Table 2. Stationarity test results (Unit root test)

Data	Stat ADF	P-Value	The Stationarity
LNFDI	-8.7870	0.0000***	1st Difference
INF	-8.0050	0.0000***	1st Difference
LNEXCH	-4.7068	0.0004***	1st Difference
GRGDP	-6.5591	0.0000***	1st Difference
GFCF	-3.1356	0.0320**	1st Difference

Notes: *, **, and *** indicate significance at 10%, 5%, and 1%, respectively

Maximum Lag Determination Results

The determination of the maximum lag was carried out using Akaike's information criteria (AIC). The maximum lag was set at lag 4. The calculation results are presented in Table 3 below:

Table 3. Maximum lag determination results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-229.4982	NA	0.0851	11.7249	11.9360	11.8012
1	-108.2372	206.1437	0.0007*	6.9119	8.1785*	7.3698*
2	-85.2445	33.3393	0.0008	7.0122	9.3344	7.8519
3	-63.0166	26.6735	0.0011	7.1508	10.5286	8.3721
4	-22.6656	38.3335*	0.0007	6.3833*	10.8166	7.9862

Notes: LR (sequential modified LR test statistics), FPE (Final prediction error), AIC (Akaike information criterion), SC (Schwarz information criterion), and HQ (Hannan-Quinn information criterion).

The next step is to select the model using the Akaike Info Criterion (AIC) method. The test was carried out with the maximum lag results above. The ARDL estimation results showed that the ARDL lag length was (1,0,4,4,4). Table 4 below shows the estimation results of the best ARDL model for manufacturing sector FDI in Indonesia.

Table **4**. ARDL model estimation results

Independent Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNFDI(-1)	0.1967	0.1731	1.1353	0.2685
LNEXCH	1.7281	0.7988	2.1634	0.0416**
INF	-0.1343	0.0574	-2.3415	0.0287**
INF(-1)	0.0303	0.0683	0.4440	0.6614
INF(-2)	-0.1465	0.0867	-1.6886	0.1054
INF(-3)	0.3210	0.0953	3.3683	0.0028***
INF(-4)	-0.1875	0.0651	-2.8787	0.0087***
GRGDP	0.1521	0.0410	3.7061	0.0012***
GRGDP(-1)	-0.1144	0.0567	-2.0175	0.0560
GRGDP(-2)	0.2246	0.0737	3.04863	0.0059***
GRGDP(-3)	-0.2161	0.2213	-0.9762	0.3396
GRGDP(-4)	0.3811	0.1809	2.1064	0.0468**
GFCF	0.0095	0.0710	0.1336	0.8949
GFCF(-1)	-0.1098	0.0544	-2.0194	0.0558*
GFCF(-2)	-0.0533	0.0615	-0.8662	0.3958
GFCF(-3)	0.0343	0.0610	0.5628	0.5792
GFCF(-4)	-0.1335	0.0766	-1.7436	0.0952*
C	-5.0266	7.8551	-0.6399	0.5288
R-squared	0.7927			
Adjusted R-squared	0.6325			
F-statistic	4.9490			
Prob(F-statistic)	0.0003			

Notes: *, **, and *** indicate significance at 10%,5%, and 1%, respectively

Table 4 shows that the exchange rate positively influences FDI inflow. Every 1 percent increase in the US dollar exchange rate causes an increase in FDI inflow in the Indonesian manufacturing sector by 1.73 percent. Domestic currency depreciation or foreign currency appreciation will cause investment costs to be cheap, low operating costs, high expected returns so that foreign investors will be interested in investing, and FDI in-flows will increase. This finding is in line with the previous studies proving that FDI inflow is positively influenced by the exchange rate (Abdulmohsen & Bel, 2020; Asiamah et al., 2019; Aziz & Mishra, 2015; Canh et al., 2020; Cuyvers et al., 2011).

Furthermore, in this study, the inflation factor harms FDI inflow, where every 1 percent increase in inflation will reduce FDI inflow in the manufacturing sector in the case of Indonesia by 0.13%. This negative effect also occurs in lag 4, where every 1 percent increase in inflation will reduce FDI inflow in the manufacturing sector in the case of Indonesia by 0.19%. High inflation causes production costs to be expensive so that foreign investors are less interested

in investing and will reduce FDI inflows. The results of this study support the results of previous studies, such as Asiamah et al. (2019), Asongu et al. (2018), and Danish & Akram (2014). However, inflation at lag 3 positively affects FDI inflows in the manufacturing sector. This can be explained from another point of view where inflation can reflect that the economy is growing. The indicator of economic growth is an increase in income which will encourage high demand for goods and services. This condition can attract investors to carry out investment activities so that FDI inflows in the manufacturing sector increase.

This study shows that GDP growth has a positive effect on FDI inflow. Every 1 percent economic growth (GDP) will increase FDI inflow in the manufacturing sector in Indonesia by 0.15%. The positive effect of eco-nomic growth also occurs at lag 2 and lag 4. GDP growth as a proxy for market size reflects the purchasing power of people in investment destination countries. The large market size and continues to increase is a conducive condition to increase the demand for goods and services produced by investors, which will enable the achievement of the economic scale. This is consistent with Aziz & Mishra (2015) and Canh et al. (2020), who found that GDP growth positively affected FDI.

Diagnostic Test Results (Classical Assumption Test)

After estimating the ARDL model, diagnostic and stability tests were then carried out to avoid errors in interpretation and conclusion. Diagnostic tests were carried out using the Normality test, Breusch-Godfrey Serial Correlation LM test, and Breusch-Pagan-Godfrey test Test (Ekananda, 2018). A diagnostic test was carried out to ensure that the ARDL model met the classical assumptions. The results of the diagnostic test of the ARDL model are presented in Table 5. Based on the normality test results, autocorrelation test, and heteroscedasticity test, it could be said that the ARDL model in this research had met the classical assumption that the error was normally distributed, did not contain serial correlation and heteroscedasticity. This was indicated by the probability value of more than the 5% significance level, accepting the null hypothesis. Thus, the model obtained was a robust model.

Table **5**. Diagnostic test results (Classical assumption test**)**

No	The Classical Assumption Test	P-Value
1	The Normality test (Jarque Bera test)	0.8166
2	The Autocorrelation test (Breusch-Godfrey Serial Correlation LM test)	0.1581
3	The Heteroscedasticity test (Breusch-Pagan-Godfrey test)	0.5205

Model Stability Test Results

The model's stability was then tested using the CUSUM of Square method, as presented in Figure 1. The CUSUM of Square stability test revealed that the tested model remained stable throughout the observation. The CUSUM of Square plot, which was still included in the 5% crucial limits interval, demonstrated this stability

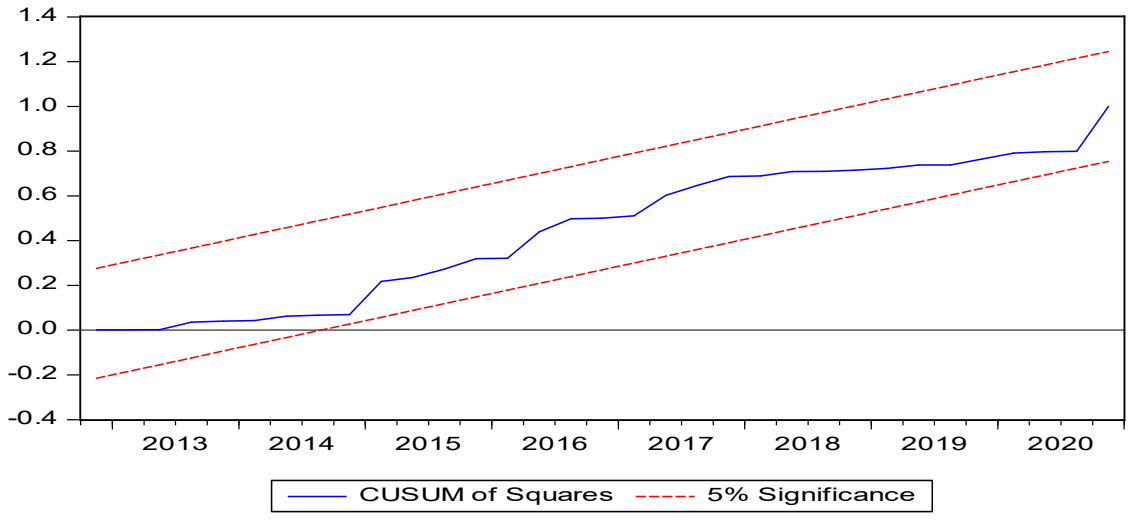

Figure 1. Model stability test results

ARDL Cointegration Test Results (Bounds Testing Cointegration)

After conducting a diagnostic test and testing the stability of the ARDL model, then a cointegration test was conducted to see the long-term relationship between FDI and the variables that influenced it. The findings of the cointegration test revealed that macroeconomic variables (inflation, exchange rates, economic growth, and gross fixed capital creation) had a cointegration relationship with FDI, as in Table 6. The result rejects the null hypothesis (there is cointegration in the model) because F-statistic > upper critical value bound I (1).

Table 6. ARDL bound rest results

Test Statistic	**Value**	**K**	
F-statistic	3.899440	4	
	Critical Value Bounds		**Conclusion**
Signif.	**I(0)**	**I(1)**	
10%	2.2	3.09	
5%	2.56	3.49	Cointegration
2.5%	2.88	3.87	

In addition to the ARDL (Bounds Testing Cointegration) cointegration test, another result that was need-ed to be checked was the error-correction coefficient (CointEq(-1)). This ECT value showed how much error was corrected in each period or how fast the adjustment was from short-term to long-term balance. The con-dition that had to be met was that the error-correction coefficient had to be negative and significant. The estimation results of the short-term model can be seen in Table 7 below. There was a cointegration relationship between the variables of inflation, exchange rate, economic growth, and gross fixed capital formation with FDI in the manufacturing sector in Indonesia. This could be seen from the error correction term or ECT coefficient (-1) that was negative and significant, which was -0.8034 (P-score 0.0000). The short-term model was pronounced valid. From these results, it could be shown that 80.34% of short-term balance fluctuations or short-term disequilibrium that occurred between FDI and exchange rates, inflation, economic growth, and gross fixed capital formation was corrected at each period, which was one quarter (because the data is quarterly data) and 19.66% of the adjustments occurred in the following months.

Tabel 7. Short-term model estimation results

Variable	Coefficient	Std.Error	t-Statistic	Probability
D(INF)	-0.1343	0.0445	-3.0171	0.0063***
D(INF(-1))	0.0129	0.0462	0.2785	0.7832
D(INF(-2))	-0.1336	0.0557	-2.3996	0.0253**
D(INF(-3))	0.1875	0.0512	3.6604	0.0014***
D(GGDP)	0.1521	0.0349	4.3644	0.0002***
D(GGDP(-1))	-0.3896	0.0692	-5.6275	0.0000***
D(GGDP(-2))	-0.1650	0.0864	-1.9107	0.0692*
D(GGDP(-3))	-0.3811	0.1446	-2.6356	0.0151**
D(GFCF)	0.0095	0.0584	0.1625	0.8724
D(GFCF(-1))	0.1525	0.0742	2.0566	0.0518*
D(GFCF(-2))	0.0992	0.0686	1.4468	0.1620
D(GFCF(-3))	0.1335	0.0620	2.1542	0.0424**
CointEq(-1)* or ECT	-0.8034	0.1499	-5.3586	0.0000***

Note: *, **, and *** indicate significance at 10%, 5%, and 1%, respectively

Long-Term Model Estimation Results

The estimation results of the long-term model can be seen in Table 8 below. The table shows that in the long run, the variable exchange rate (LNEXCH), inflation (INF), and economic growth (GRGDP) had a significant effect on FDI in the manufacturing sector. These three variables had the potential to attract FDI in the manufacturing sector in Indonesia.

The exchange rate had a positive and significant effect on FDI in the manufacturing sector at 5%. This showed that the rupiah depreciation or the USD appreciation caused the export prices of manufactured products in foreign markets to be relatively lower so that it could increase demand for foreign consumers and had an impact on increasing export results. Countries with a depreciating currency value had a location advantage, so they became attractions for foreign investors to invest because they increased production efficiency. In addition, that attraction arose from the wages of workers and production costs that decreased because the value of the country's currency had depreciated (Goldberg & Klein, 1997). These results follow the results of previous research showing that exchange rate positively affected FDI (Abdulmohsen & Bel, 2020; Asiamah et al., 2019; Aziz & Mishra, 2015; Canh et al., 2020; Chiappini, 2014; Cuyvers et al., 2011; Jaiblai & Shenai, 2019; Tsen, 2005).

In the long term, the inflation factor (INF) had a significant and negative effect on FDI inflows in the manufacturing sector. This was indicated by the coefficient value that was negative and significant at the 5% level. These results indicated that inflation could invite FDI inflows in the manufacturing sector. FDI entering a country sought to take advantage of the factors that enabled it to compete in international markets. The negative effects of inflation on FDI inflows were in accordance with the hypothesis of this research. The study results illustrated that the lower the inflation was, the higher the FDI inflows were or vice versa. The increase in inflation caused people's purchasing power to decrease. If this general price increase continued to cause less profit. This was because, in addition to the declining purchasing power of the people towards goods, inflation could also cause the level of risk of business failure to increase, which in turn made domestic investment less attractive. This is in line with the study of Asiamah et al. (2019), Danish & Akram (2014), and Ngo et al., 2020), who found that inflation emerged as an indicator of economic stability that had a negative and significant effect on FDI.

In addition to the exchange rate and inflation, economic growth or GDP growth (GRGDP) had a positive and significant effect on FDI inflows in the manufacturing sector at 5%. Economic growth or GDP growth was a proxy for the market size that showed the number of certain individuals who were potential buyers or payers of the products and services produced by entrepreneurs or investors. A larger market size provided a great opportunity for the sale of the output that had been produced, thus allowing for an increase in profits. This further attracts FDI inflows to that country (Asiamah et al., 2019; Asongu et al., 2018; Chiappini, 2014; Ngo et al., 2020; Sharma, 2019; Tsen, 2005; Vijayakumar et al., 2010). Meanwhile, the variable gross fixed capital formation (GFCF) did not affect FDI inflows in the manufacturing sector.

Table 8. Long-term model estimation results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNEXCH	2.1509	0.9472	2.2708	0.0333**
INF	-0.1454	0.0557	-2.6103	0.0160**
GRGDP	0.5319	0.2062	2.5791	0.0171**
GFCF	-0.3147	0.1896	-1.6601	0.1111
C	-6.2564	9.8701	-0.6339	0.5327

Note: *, **, and *** indicate significance at 10%, 5%, and 1%, respectively

In the long term, the exchange rate, inflation, and economic growth significantly affect FDI inflow. The exchange rate positively influences FDI inflow in the manufacturing sector with a value greater than the economic growth factor. The implications of strengthening the dollar's exchange rate against the rupiah on FDI inflows depend on the size of the percentage of capital goods that must be imported. If the value of the component of imported capital goods is significant, it will discourage investors from the recalculation of their investment, and this can slow down the pace of investment, low employment, and low economic growth. On the other hand, if the value of the imported capital goods component is small, investors will immediately invest because the investment costs will be cheaper, thus accelerating the rate of investment, high employment, and increasing economic growth. The effect of strengthening the dollar's value on state finances is becoming more severe, especially to pay foreign debts, both government and private debts, and to finance the purchase of other imported goods. Meanwhile, for exporters, the strengthening of the dollar is a win fall gain. In dynamic analysis, changes in economic policy and non-economic factors are very sensitive to changes in exchange rates.

The negative effect of inflation on FDI inflow implies that high inflation rates are a sign of economic and monetary instability, which can also increase costs and reduce the ability of multinational companies to compete in international markets. In the long term, economic development prospects will worsen if inflation is not controlled. More serious inflation reduces productive investment, reduces exports, and increases imports. This tendency will slow down economic growth. Of course, this is a consideration for foreign investors who want to invest in an unstable economy from too high inflation.

The positive effect of economic growth on FDI inflow indicates the development of the production of goods and services in a country, such as an increase in the number of industrial goods and an increase in the production of capital goods. The general implication is that host countries with larger market sizes, faster economic growth, and higher levels of economic development will provide more and better opportunities for industries to exploit their proprietary advantages and, therefore, attract more FDI. A higher rate of economic growth is an indication of macroeconomic health and thus results in increased confidence in investment and will further encourage even higher economic growth.

5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

This research aims at examining the determinants of FDI inflows in the manufacturing sector in Indonesia using time series data with an observation period starting from the 1st quarter of 2010 to the 4th quarter of 2020. ARDL cointegration analysis was employed to examine the long-term relationship between FDI and its determinants. Overall, research results showed that economic growth could attract FDI in the manufacturing sector. The higher the economic growth was, the greater the FDI inflows were in the manufacturing sector. Similarly, the exchange rate (USD/Rupiah) positively affected FDI inflows in the manufacturing sector.

The implication of this research is that to attract investment from abroad, the government's efforts to control inflation have to be strengthened continuously by maintaining the availability of supply and distribution of goods, especially during the COVID-19 pandemic. Supply continuity and smooth distribution between regions have to be further improved by utilizing information technology and strengthening inter-regional cooperation. Likewise, efforts to increase economic growth have to continue to be improved by providing incentives or facilities to companies at various levels, both export-oriented and those that focus on domestic sales. Several efforts to revitalize the economy include supporting exports by making procedures easier, providing tax relief, making financing easier, and increasing government spending to overcome the COVID-19 pandemic. In addition, other efforts to attract investors are infrastructure improvements, regulations in the field of employment, ease of bureaucracy, and legal certainty. Furthermore, therefore, the role of the government is very important in controlling national economic and political stability so that exchange rate stability can be maintained so that benefiting the Indonesian business and attracting more FDI inflows.

This research has limited data, so further research can be carried out using annual data so that several variables such as employment, infrastructure, education, research, interest rates, foreign debt, country risk index, and others can be observed. It is also important for further research to use panel data to observe several other economic sectors.

REFERENCES

Abdulmohsen, A. & Bel, T. (2020). Foreign direct investment determinants in an oil abundant host country: short and long-run approach for Saudi Arabia. *Resources Policy*, *66*, 101616.

Appiah, M., Li, F., & Korankye, B. (2019). Foreign investment & growth in emerging economies: panel ARDL analysis. J*ournal of Economics, Business, & Accountancy Ventura*, 22(2), 274-282.

Asiamah, M., Ofori, D., & Afful, J. (2019). Analysis of the determinants of foreign direct investment in Ghana. *Journal of Asian Business and Economic Studies*, *26*(1), 56–75.

Asiedu, E. (2005). Foreign direct investment in Africa: The role of natural resources, market size, government policy, institutions and political instability. *WIDER Research Paper*.

Asongu, S., Akpan, U. S., & Isihak, S. R. (2018). Determinants of foreign direct investment in fast-growing economies : evidence from the BRICS and MINT countries. *Financial Innovation*, 4(1), 1-17.

Aziz, O. G. & Mishra, A. V. (2015). An international and comparative review determinants of fdi inflows to Arab economies. *The Journal of International Trade & Economic Development*, 25(3), 325-356

Bank Indonesia. (2020). *Statistik ekonomi dan keuangan indonesia (SEKI)*.

https://www.bi.go.id/id/statistik/seki/terkini/riil/Contents/Default.aspx

Canh, N. P., Binh, N. T., Thanh, S. D., & Schinckus, C. (2020). Determinants of foreign direct investment inflows: The role of economic policy uncertainty. *International Economics*, 161, 159-172.

Chiappini, R. (2014). Institutional determinants of Japanese outward FDI in the manufacturing industry. *GREDEG Working Paper Series*.

Cuyvers, L., Soeng, R., Plasmans, J., & Bulcke, D. Van Den. (2011). Determinants of foreign direct investment in Cambodia. *Journal of Asian Economics*, *22*(3), 222–234.

Danish, R. Q., & Akram, A. (2014). Determinants of FDI in Pakistan: An empirical analysis. *Journal of International Business and Economics*, *2*(2), 61–70.

Ekananda, M. (2018). *Analisis Ekonometrika Time Series* (2nd ed.). Mitra Wacana Media.

Faeth, I. (2009). Determinants of foreign direct investment – A tale of nine theoretical models. *Journal of Economic Surveys*, *23*(1), 165–196.

Goldberg, L. S. & Klein, M. W. (1997). *Foreign direct investment, trade and real exchange rate linkages in Southeast Asia and Latin America* (Vol. 6344). Cambridge: National Bureau of Economic Research.

Gomes, P., Castro, D., & Aparecida, E. (2013). The determinants of foreign direct investment in Brazil and Mexico : an empirical analysis. *Procedia Economics and Finance*, *5*(13), 231–240.

Gujarati, D. N. & Porter, D. C. (2009). *Basic Econometrics*, 5th ed. New York: McGraw-Hill Series.

Hailu, Z. A. (2009). Demand side factors affecting the inflow of foreign direct investment to african countries: Does capital market matter ? *International Journal of Business and Management*, *5*(2010), 104–116.

Hoang, H. H. & Bui, D. H. (2014). Determinants of foreign direct investment in ASEAN: A panel approach Hong. *Management Science Letters*, *5*, 213–222.

Jaiblai, P. & Shenai, V. (2019). The Determinants of FDI in Sub-Saharan Economies: A study of data from 1990 – 2017. *International Journal of Financial Studies*, *7*, 1–31.

Kaliappan, S. R., Khamis, K. M., & Ismail, N. W. (2015). Determinants of services FDI inflows in ASEAN countries. *International Journal of Economics & Management*, 9(1), 45-69

Labibah, S., Jamal, A., & Dawood, T. C. (2021). Indonesian export analysis: autoregressive distributed lag (ARDL) model approach. *Journal of Economics, Business, & Accountancy Ventura*, *23*(3), 320–328.

Liu, K. & Daly, K. (2011). Foreign direct investment in china manufacturing industry – transformation foreign direct investment in china manufacturing industry – Transformation from a low tech to high tech manufacturing. *International Journal of Business and Management*, *6*(7), 15–27.

Mahmood, H., & Alkhateeb, T. T. (2018). Foreign direct investment, domestic investment and oil price nexus in Saudi Arabia. *International Journal of Energy Economics and Policy*, *8*(4), 1–5.

Michalíková, E., & Galeotti, E. (2010). Determinants of FDI in Czech manufacturing industries between 2000-2007. *South East European Journal of Economics and Business*, 5(2), 21-32.

Ngo, M. N., Cao, H. H., Nguyen, L. N., & Nguyen, T. N. (2020). Determinants of foreign direct investment: Evidence from Vietnam. *Journal of Asian Finance, Economics and Business*, *7*(6), 173–183.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of applied econometrics*, 16(3), 289-326.

Ranjan, V. (2011). FDI Inflow determinants in bric countries: A panel data analysis. *International Business Research*, *4*(4), 255–263.

Sasana, H. & Fathoni, S. (2019). Determinant of foreign direct investment inflows in ASEAN countries. *Journal of Economics and Policy*, *12*(2), 253–266.

Sharma, A. M., & Baby, S. (2019). Determinants of foreign direct investment in India's service sector. *International Journal of Public Sector Performance Management*, 5(3-4), 260-277.

Sumiyati, E. E. (2020). Factors Affecting Manufacturing Exports. *Journal of Economics, Business, and Accountancy Ventura Vol.*, *23*(2), 254–266.

Tsen, W. H. (2005). The determinants of foreign direct investment in the manufacturing industry of Malaysia. *Journal of Economic Cooperation 26, 2*, 91–110.

Vijayakumar, N., Sridharan, P., & Rao, K. C. S. (2010). Determinants of FDI in BRICS countries: A panel analysis. *International Journal of Business Science & Applied Management (IJBSAM)*, *5*(3), 1–13.

Xaypanya, P. (2015). The determinants of foreign direct investment in ASEAN The first differencing panel data analysis Phonesavanh. *International Journal of Social Economics*, *42*(3), 239–250.