



# The Impact of Domestic Investment, Foreign Investments, HDI, Export, and Import on the Economic Growth in Indonesia

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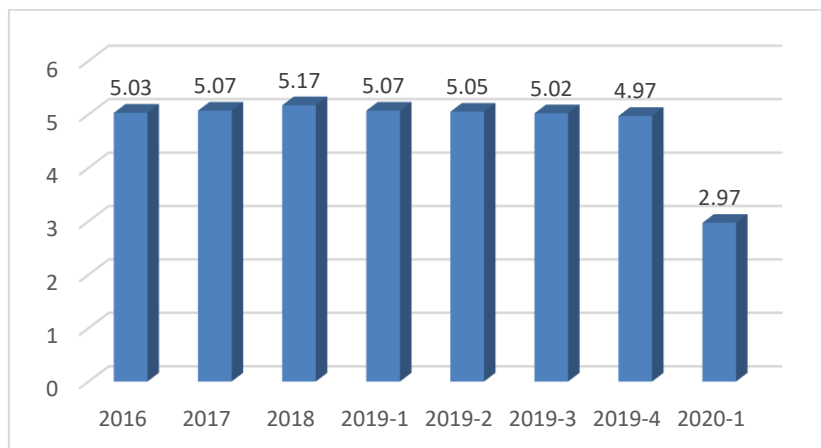
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**Abstract.** The aims of this study were examined the causal relationship between domestic investment, foreign, Export, Import, HDI and their impact on Indonesia's economic growth measure with GDP. The data used was panel data from 18 provinces in 2016-2020 which was taken based on stratified random sampling. The model used to complete the purpose of this research was panel data regression. The results of the analysis show economic growth based on the value of GDP in each province tends to decline. Modelling of economic growth in Indonesia was used Panel Data Regression. In this research, Hausman Test is used to obtain the best model of panel data regression because the model contain of Random Effect Model. Based on Simultaneous test results obtained at least one significant variable to the model and based on partial test the GDP was significantly influenced by the variables of FDI, DDI, HDI and Import sectoral value. Variable Export has an effect on GDP but is not significant where  $R^2$  shows the results of 98.9%.

## 1. Introduction

The global health crisis that occurred in early 2020 had an impact on various sectors, one of which was affected by the performance of the domestic economy. Fluctuations in economic performance in the country can be seen from economic growth. Economic growth is a real picture of the impact of a development policy implemented, especially in the economic field. Economic growth is the rate of growth formed from various economic sectors that describe the level of economic change that occurs. For regions, this indicator is very necessary to know the success of development that has been achieved and is useful for determining the direction of development in the future. Economic growth is one indicator of the success of a country's economy. The indicator that can be used to measure economic growth is Gross Domestic Product (GDP). Economic growth in Indonesia in 2020 is 2.97 percent [1]. almost all sectors grew sluggishly due to the global health crisis. This was due to the decline in global and domestic demand as well as the weakening of international commodity prices.



**Figure 1.** Economic growth in Indonesia (source: Badan Pusat Statistik 2020)

Figure 1 shows that the condition of economic growth from 2016 to 2019 has fluctuated but when compared to the beginning of 2020, it has greatly decreased compared to the end of 2019 which was the lowest for the last 6 years. When viewed from the national economic growth, the regions of Sumatra, Java, and Sulawesi are above national growth. Meanwhile, the areas of Bali and Nusa Tenggara, Kalimantan, as well as Maluku, and Papua are under national growth [1].

However, Indonesia still has the potential to become a developed country. It is not surprising that quite some developed countries have begun to look at the market in Indonesia as a place for them to invest. Investment is very important in influencing Indonesia's economic growth because it can improve people's welfare. Thus, the investment will have an impact on economic growth which in turn has implications for employment opportunities in an area [2]. The amount of natural resources and human resources in Indonesia is the main attraction for Indonesia to promote its country. It is not an easy matter for Indonesia to attract rich investors to invest in Indonesia. This is due to several things that prevent investors from investing in Indonesia. High investment value will have a big impact on the nation's economy and vice versa if a low investment will hinder development and the implication is that the number of unemployed will automatically increase. However, in its development, the Indonesian economy emphasizes high economic growth and in fact, it is still vulnerable to its ability to neutralize the negative effects of globalization and international market turmoil. To achieve high economic growth, it is necessary to increase the value of a positive investment for the continuity of business actors because the most effective source of capital formation is domestic savings, but domestic capital formation in Indonesia is still low, so the role of exports, imports, and foreign investment is still needed. Thus, the rise and fall of the level of economic activity are determined by changes in each factor or a combination of these factors. However, each factor has a different influence in influencing economic fluctuations that apply from time to time. Iqbal and Jamil (2015) measured economic growth based on the interest rate and government investment factors using econometric models [3]. Chaudury, et al (2020) measure economic growth based on sector composition using multiple regression [4]. Sucubasi, et al (2021) measure FDI on Domestic Investments in Western Balkans using Panel Data Regression [5].

Based on the data taken in this study, namely economic growth data from 2016 to 2020 quarter 1, the data structure formed is panel data so that to complete the objectives in this study panel data regression is used. Panel Data Regression is a method to determine the effect of independent variables on the dependent variable using Ordinary Least Square (OLS) regression analysis on the model with a combination of time series and cross-section [6]. Panel data has several advantages, namely being able to regulate the heterogeneity of the object of observation, providing more informative data with more variability, small collinearity between variables, being able to study the dynamics of adjusting cross-sectional data, being able to identify and measure effects that are not detected in cross-sectional or cross-sectional data. time-series can reduce or even eliminate bias resulting from combining several cross-sectional units.



**2. Methodology**

To accomplish this goal, this study collects data that are suspected to support economic growth in Indonesia. This research data is secondary data taken from the Badan Pusat Statistik (BPS). The research unit used in this study is 9 provinces in Indonesia, where the time period used is 2016 to 2020. Based on 34 provinces in Indonesia, in this study 9 provinces were chosen by using stratified random sampling which has previously been grouped into provinces with medium, high and low GDP. Then taken proportionally from each group. The research variables and data structures used in this study are shown in the following table.

**Table 1.** Description of Variables

Variable	Symbol	Description	Unit
<b>Dependent</b>	Y	Gross Regional Product (GDP)	Million USD
	X1	Foreign Investment (FDI)	Million USD
<b>Independent</b>	X2	Domestic investment (DDI)	Million USD
	X3	Export	Million USD
	X4	Imports	Million USD
	X5	Human Development Index (HDI)	Percentage

Meanwhile, the data structure used in this study can be seen in the following table.

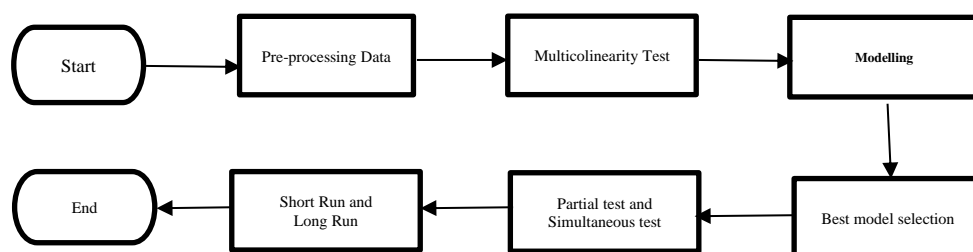
**Table 2.** Structure Data

Subject	Year (t)	Dependent	Independent			
			X1	X2	...	X5
<b>Province (1)</b>	2016	Y (1;2016)	X1 (1;2016)	X2 (1;2016)	...	X5 (1;2016)
	2017	Y (1;2017)	X1 (1;2017)	X2 (1;2017)	...	X5(1;2017)
	:	:	:	:	...	:
	2020	Y (1;2020)	X 1(1;2020)	X 2(1;2020)	...	X5(1;2020)
	:	:	:	:	:	:
<b>Province (9)</b>	2016	Y (9;2016)	X1 (9;2016)	X2(9;2016)	...	X5(9;2016)
	2017	Y (9;2017)	X1 (9;2015)	X2 (9;2017)	...	X5(9;2017)
	:	:	:	:	...	:
	2020	Y (9;2020)	X1 (9;2020)	X2 (9;2020)	...	X5(9;2020)
	:	:	:	:	:	:

The specification of the model built in this study is the model of the gross regional domestic product (GDP). The model built is as follows.

$$GDP_{it} = FDI_{it} + DDI_{it} + Export_{it} + Im port_{it} + HDI_{it} + e_{it} \tag{1}$$

The steps of analysis in this study can be shown as figure 2



**Figure 2.** Flowchart Research



The first step is selecting data for the panel regression from Badan Pusat Statistik. The data set contained of 34 provinces. Then 9 provinces were selected based on stratified random sampling which has previously been grouped into provinces with medium, high and low GDP. The next step is creating data structure, and to visualise the relationship of the variable used multicollinearity test. After modelling the data with panel data regression, following step is choosing the best model using partial and simultaneous test.

### 2.1. Panel Data Regression Theory

This study uses Panel Data Regression, where the model was a modification of previous studies. Panel data regression is a regression with a data structure that is panel data. Estimation of parameters in regression analysis with cross-sectional data was carried out using the least squares estimation method or called Ordinary Least Square (OLS) [6]. Panel data was a combination of cross-section data and time-series data. Time-series is data related to certain periods. While the cross-section is data consisting of several types of data in a certain period. The general panel data regression model is in the following equation.

$$y_{it} = \alpha_{it} + \beta X_{it} + e_{it} \quad (2)$$

where,

$y_{it}$  : The Dependent variable of the i-th individual unit for the t-time period.

$\beta'$  :  $(\beta_1, \beta_2, \dots, \beta_K)$  the slope coefficient vector is  $1 \times K$ , where  $K$  is the Independent variable

$X_{it}$  : Observations of the predictor variables from the i-th individual and the t-th time period.

$\alpha_{it}$  : Intercept coefficient for each individual i and time t.

$e_{it}$  : Residual in time period t,  $e_{it} \sim IIDN(0, \sigma^2)$ .

### 2.2. Model Estimation

In estimating the panel regression model, there are three approaches that are often used, including the common effect model (CEM), Fixed Effect Model (FEM) and random effect model (REM). CEM is the simplest approach by ignoring the cross section and time series dimensions. The CEM model assumes that the intercept of each variable is the same, as well as the slope coefficients for all time series and cross section units. In estimating CEM parameters, the least squares method can be used [7]. FEM is an approach for estimating panel data that can be differentiated by individual and time. FEM also uses the OLS approach in its estimation technique, but the difference in the intercept is expressed by a dummy variable. While the REM approach involves correlation between error terms due to changes in time and individuals [6]. The OLS method cannot be used to obtain an efficient estimator for REM. The right method for estimating REM is Generalized Least Squares (GLS).

### 2.3. Best Model Selection

To find out the model to be used, the following model specification test was carried out. There are two types of test to select the best model of panel regression. Chow test is a test performed to choose between CEM or FEM to estimate panel data. Hausman test is a test to choose the best model between FEM and REM.

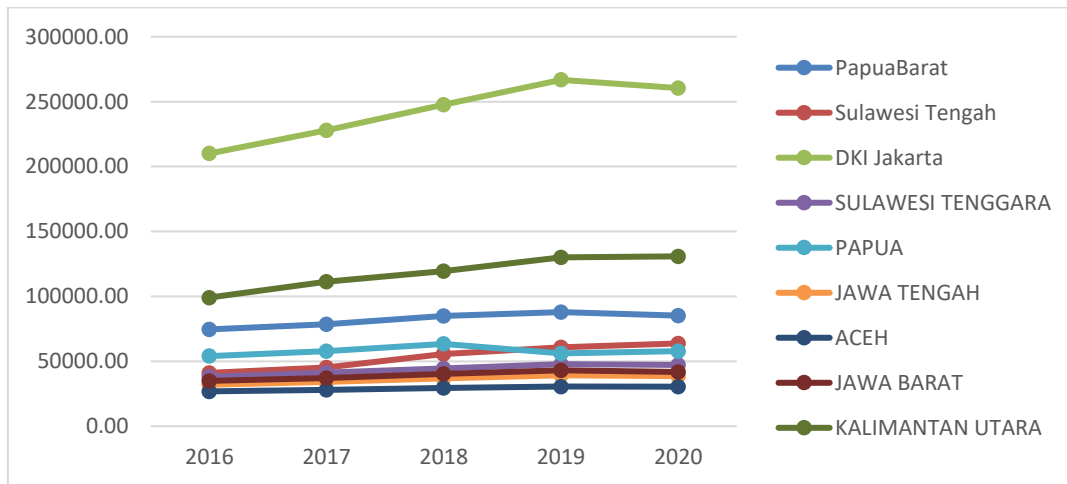
### 2.4. Testing Regression Model Parameters

The regression model parameter testing was conducted to determine the relationship between the response variable and the predictor variable. There are two tests that must be carried out, namely simultaneous testing and individual testing [9]. Simultaneous testing is carried out to check the significance of the  $\beta$  coefficient simultaneously on the response variable [10]. Partial or individual testing is used to determine the parameters that have a significant individual effect on the model [10].



### 3. Result and Discussion

The characteristics of Indonesia's GDP from 2016 to 2021 will be explained using descriptive statistics tables and graphics. The following graph was a description of 9 provinces with Medium, Low and High GDP which are taken as samples.



**Figure 3.** GDP 9 Province Fluctuation in Indonesia (2016-2021) Million USD

Figure 3 shows that the province with the highest GDP was DKI Jakarta and the province with the lowest GDP was Aceh. From the picture, it can be seen that at the beginning of 2020, when global health cases occurred, GDP in each province decreased. The measurement of the decline in GDP can be measured by looking for a model that fits the GDP where in this study the independent factors used were FDI, DDI, Export, Import and HDI. Because the data used is panel data, the next test follows the rules of panel data regression.

#### 3.1. Multicollinearity Test

Modelling of GDP in Indonesia was obtained using the panel data regression method, it was necessary to know the relationship between the variables were thought to affect economic growth. The description of the relationship between variables was explained through the correlation matrix between the independent variables and the dependent variable which can also be called multicollinearity testing. Multicollinearity was existence of a strong linear relationship between several independent variables in a panel data regression model which can be seen in the following table.

**Table 3.** Multicollinearity Test Results

Variabel	FDI	DDI	EKSPORT	IMPORT	GDI	GDP
<b>FDI</b>	1,000	0,748	0,287	0,489	0,358	0,375
<b>DDI</b>		1,000	0,244	0,500	0,239	0,345
<b>EKSPORT</b>			1,000	0,175	0,202	0,135
<b>IMPORT</b>				1,000	0,446	0,752
<b>GDI</b>					1,000	0,469
<b>GDP</b>						1,000

Based on Table 3, it is known that all correlation values are less than 0,8. So, it can be concluded that there is no case of multicollinearity, so there is no relationship between the variables used to measure economic growth in Indonesia



### 3.2. GDP Model Selection

To find out the appropriate panel regression model in estimating the relationship between independent variables and GDP in Indonesia, the panel regression model was selected first. Several models to choose include the common effect model (CEM), fixed effect model (FEM) and random effect model (REM). The Chow test is used to choose between CEM or FEM to estimate panel data. The results of the tests that have been carried out are as follows.

**Table 4.** Chow Test Results

Measurement	Value
<b>Ftest</b>	21,468
<b>Ftable</b>	4,457
<b>P-value</b>	0,000

Based on Table 4, it can be seen that the results of the Chow test resulted in an Fcount of 21,468. By using  $\alpha = 0,05$ ,  $df_1 = 17$  and  $df_2 = 67$ , we get  $F_{table} = F_{(0,05;17;67)}$  was 4,457. The value of Fhitung was greater than Ftable, so reject  $H_0$ . If viewed from the P-value was 0,0000 which is smaller than 0,05, then reject  $H_0$ . Based on the results of the Chow test, it can be seen that the FEM model was a more suitable model to analyze the relationship between independent variables on GDP in Indonesia.

Based on the results of the Chow test, it was determined that the model that was more suitable for analyzing the relationship between the independent variables and GDP was FEM. Furthermore, advance test was carried out with the Hausman test to determine the most appropriate model between FEM or REM.

**Table 5.** Hausman Test Results

Measurement	Value
<b>W</b>	6,347
$\chi^2_{table}$	11,070
<b>P-value</b>	0,274

Based on Table 5, it can be seen that the results of the Hausman test resulted in an Wvalue of 6,347. By using  $\alpha = 0,05$ ,  $df=5$ , we get  $\chi^2_{table}$  was 11,070. The value of Wvalue was greater than  $\chi^2_{table}$ , so failed to reject  $H_0$ . If viewed from the P-value was 0,274 which is greater than 0,05, then failed to reject  $H_0$ . Based on the results of the Hausman test, it can be seen that the REM model was a more suitable model to analyse the relationship between independent variables on GDP in Indonesia. The result of Estimation Coefficient using REM model as followed

**Table 6.** Estimation Model using REM Results

Variable	Coefficient	Std, Error	t-Statistic	Prob,
<b>FDI</b>	0,476	0,140	3,393	0,001
<b>DDI</b>	0,174	2,027	0,186	0,032
<b>Export</b>	0,004	0,408	0,011	0,092
<b>Import</b>	0,313	0,298	10,521	0,030
<b>HDI</b>	4,330	8930,233	4,849	0,000



So that, the panel data regression model formed for GDP can be written in the following mathematical equation.

$$GDP_{it} = C_{it} + FDI_{it} + DDI_{it} + Export_{it} + Import_{it} + HDI_{it}$$

$$GDP_{it} = C_{it} + 0,476FDI_{it} + 0,174DDI_{it} + 0,004Export_{it} + 0,313Import_{it} + 4,330HDI_{it} \quad (3)$$

C is the intercept for the i-th individual. In this study, the i-th individual is from each province which was taken as a sample of 9 provinces.

Based on Equation 3, it can be seen that the coefficient value of the FDI variable is 0.476. A positive sign indicates that the higher the FDI, the higher the economic growth as measured by GDP so that if FDI increases to 1 million USD, GDP will increase by 47.6%. The coefficient value of the DDI variable is 0.174. A positive sign indicates that the higher the DDI, the higher the value of GDP. If DDI increases by 1 million USD, then the value of GDP will increase by 17.4%. The coefficient value of the Export variable is 0.004 and is positive. So if there is an increase in the value of export goods by 1 million USD in Indonesia, it will affect the increase in GDP by 0.04%. While the value of the variable import coefficient is 0.313 and is positive, then if there is an increase of 1 million USD in the value of imports in Indonesia, it will affect the increase in GDP by 31.3%. The HDI coefficient value of 4.330 can be said if the HDI increases 1 time it will affect the increase in GDP by 4 times

### 3.3. Simultaneous and Partial Test

Simultaneous test is testing the parameters on the regression model simultaneously to know the predictor variables that affect the GDP variable. From the processing results obtained the following results

**Table 7.** Simultaneous Test Results

Measurement	Value
<b>F</b>	381,040
<b>Ftable</b>	4,457
<b>P-value</b>	0,000
<b>R<sup>2</sup></b>	0,989

Based on Table 7 above, it can be seen that the Fcount value is 381,040. By using  $\alpha = 0,05$ ,  $df_1 = 17$  and  $df_2 = 67$ , then the value of  $F_{table} = F_{(0,05;17;67)}$  is 4,457. The value of Fcount is greater than Ftable, so reject  $H_0$ . From the results obtained a probability value of 0,000 is smaller than  $\alpha = 0,05$ , then reject  $H_0$ . This means that simultaneously the model was significant or there was at least one predictor variable that has a significant effect on the GDP variable. Furthermore, it will be seen which variables affect GDP significantly. In this study using a t-test, based on processing the results can be seen in table 6. Where the probability value less than  $\alpha = 0,05$  is a significant variable for the panel data regression GDP model. In this case, the variables that have a probability value of less than 5% are FDI, DDI, Import and HDI, while the Export variable has no significant effect on the panel data regression GDP model.

Furthermore, to strengthen the previous statement on the simultaneous and partial test. Then it will be seen the value of  $R^2$  from the model. The  $R^2$  value obtained from the model is 98.9%. This  $R^2$  value is quite good, so the model obtained is appropriate. The  $R^2$ -value of 98.9% means that the variation in the diversity of economic growth as measured by the GDP variable can be explained by the independent variable in the model of 98.9% and the remaining 1.1% is explained by other variables outside the model.

## 4. Conclusion

Indonesia's economic growth as measured by GDP in the 2016 to 2020 period has fluctuated. Based on the analysis of the characteristics of the data, a significant decline occurred in early 2020 compared to the end of 2019, this happened because the whole world was experiencing a global health crisis. This is reflected in the indicators of economic growth in 18 provinces in Indonesia which were selected by stratified random sampling. The indicators used in this research are Domestic Investment (DDI),



Foreign Investment (FDI), Human Development Index (HDI), Export Sectoral Value and Import Sectoral Value. Based on the estimation results of the model, the Random Effect Model is the most suitable for modeling GDP based on these indicators. Of the 5 indicators, the export sectoral value variable is not proven to have a significant effect.

## 5. Acknowledgement

Researcher would like to thank Badan Pusat Statistika (BPS) for providing data that researcher can process into analysis, which can later assist in the scientific development of researchers. Researcher dedicate this research to academics who will do further research/apply the panel data regression model for existing data at BPS or other data.

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