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DETERMINANT ANALYSIS OF INDONESIAN GDP PER CAPITA 1991-2020: ECM METHOD

Rekno Hidayati[1*], Lucia Rita Indrawati[2]
[1,2]Faculty of Economics, Universitas Tidar
E-mail: [1)] reknohidhaa@gmail.com, [2)] luciaritaindrawati@yahoo.co.id

Abstract
Indonesia's economic growth is known to fluctuate. The government and banks have taken a number of policies to maintain macroeconomic stability that have an impact on the domestic economy in order to prevent a recession from occurring on economic growth. This study aims to determine the factors that can affect GDP per capita in the long term and short term. This study uses descriptive and quantitative methods, and the methodology used is econometrics and processed using statistical software EVIEWS. In this study, the data used is secondary data in the form of time series or time series. The variables tested include Final Consumption Expenditure, Foreign Investment, and the Female Labor Participation Rate. The results of the analysis on short-term tests, all variables tested have no significant effect on GDP per capita. Meanwhile, in the long run it is known that only the final consumption expenditure variable has an effect on Indonesia's GDP per capita for the 1991-2020 period.

Keywords: *ECM, Final Consumption Expenditure, Foreign Direct Investment, GDP per capital, Women's Labor Force Participation Rate*

1. INTRODUCTION

Gross Domestic Product (GDP) per capita has been agreed by all countries as an indicator to find out and measure the average income per resident in a region or country. The calculation is obtained based on the value of GDP divided by the existing population. Indonesia itself always refers to GDP per capita to measure the level of welfare of its population (Mahardiki & Santoso, 2013). This is because with these indicators it can be seen the average income per resident.

World Bank data lists Indonesia's nominal Gross Domestic Product (GDP) per capita in 2020 at US$ 3.869,59 per capita or Rp54,58 million per capita at the current exchange rate of Rp14.105,1 per US$. If we look at the history of Indonesia's GDP development over the course of different time periods, we can see that the Indonesia's GDP per capita has fluctuated throughout the years. In the 1970s, per capita GDP growth was still sloping but gradually increasing. Until 1998 it experienced a significant decline due to the economic crisis at that time. The decline is in the range of USD 500 per capita. The resurgence of per capita GDP growth is slowly moving the chart in a positive direction. Until 2019, Indonesia's per capita income reached USD 4.000 per capita. 2020 was the first year for the decline in the development of per capita income in Indonesia. The Covid 19 pandemic caused almost all economic sectors to experience paralysis. So that it has an impact on decreasing income for each resident and GDP per capita slumps to USD 3.800-3.900.

Per capita income is important in order to see whether a country's economic growth is already running or developing well or is it experiencing a decline (Hasanuddin

Remmang, 2021). Gross Domestic Product (GDP) allows us to measure economic growth based on the total revenue earned by different economic activities (Mankiw, 2018). As according to Mankiw (2018), Gross Domestic Product refers to a market value of all goods and services that have been produced by a country within a certain period or period. GDP has inherent components, including consumption and investment. There are many other derivative components of per capita income. One of them is the human resource component which is realized in labor force participation.

Several previous studies have examined how these various variables influence economic growth in terms of per capita income. Almasifard (2013) examines the effect of final consumption expenditure on GDP. Based on the analysis used in the form of panel regression analysis and reviewing general trends in the macro conditions of the selected countries, it was found that there was a positive effect between Final Consumption Expenditure and GDP. Similar results were also obtained by the research conducted Obinna (2020) who examines the effect of Final Consumption Expenditures on GDP in Nigeria.

Regarding Foreign Direct Investment (FDI), based on various previous studies, it has positive and even negative effects in the short and long term on GDP. Cahyaningsih (2015) analyze the factors that influence Foreign Direct Investment in Indonesia. One of the variables examined is regarding the influence of GDP itself. With the cointegration test to determine the long-term and short-term effects on investment, the research shows that GDP has no significant effect. In the long run, GDP has a significant and positive influence at 5%.

The variable female labor force participation rate or female labor force participation rate has an influence on GDP. Khaliq et al. (2017) examines how the level of women's participation in driving economic growth in Pakistan. The result is that there is a long-term relationship between the participation rate of the female workforce and economic growth.

Therefore, this research aims to find out other factors regarding whether quantitatively has an effect on the long-term and short-term GDP growth per capita. The variables that will be examined are how its growth affects GDP per capita, namely Final Consumption Expenditure, Foreign Direct Investment, and Labor Force Participation Rate, female.

From the descriptions, statements and studies that have been described above, the temporary assumptions or hypotheses that will be investigated further are true according to the variables and data raised in this study, while the hypotheses are as follows. The hypothesis in this study are:

1) There was a positive influence on the participation rate of the female labor force on Indonesia's per capita income in the 30 year period from 1991 to. 2020
2) There was a positive effect of final consumption expenditure on Indonesia's per capita income within 30 years from 1991 to. 2020
3) There has been a positive influence of foreign direct investment on Indonesia's per capita income in the 30 years since 1991 till. 2020
4) There is a negative effect on the participation rate of the female labor force on Indonesia's per capita income within 30 years from 1991 to. 2020
5) There was a negative effect of final consumption spending on Indonesia's per capita income in the 30 years from 1991 to 1991. 2020

6) There is a negative effect of foreign direct investment on Indonesia's per capita income within 30 years from 1991 to. 2020

In this work, the Error Correction Model (ECM) method was used to determine the outcomes of long-term and short-term impacts on the variables listed above. The data utilized in this study is a time series data. Hence, this work used the econometric approach specified for ECM-processed data to identify a linear regression model.

2. RESEARCH METHODS

The scope of the object area in this study was Indonesia. By using annual data that comes from the official website Banks (2022) for the 1991-2020 period, including data on per capita income, female labor force participation, final consumption expenditure, and foreign direct investment. Each of these variable roles, namely:

The dependent variable was Indonesia's GDP per capita, whose data was based on the current US$, in the period 1991-2020.

Independent variable :

1) Final Consumption Expenditure (FCE) in units of % for the 1991-2020 perio
2) Foreign Direct Investment (FDI) in % units for the 1991-2020 period
3) Women's Labor Force Participation Rate, Female (LFP) in % units based on population aged 15 years and over for the period 1991-2020

This study used descriptive and quantitative methods, and the methodology used was econometrics and processed using statistical software EVIEWS. In this case the data used secondary data in the form of time series or time series. However, time series data often experience non-stationarity in levels, this causes estimates of the results to possibly give false results (Granger, 1981). So the first step is to test for the existence of a unit root, in order to eliminate the problem of inaccurate estimation. In this step, it was necessary to pay attention to the order of Integration checks on each variable. That was how many times it took for the data to reach its point of stationarity.

The processing flow of time series analysis in this study used the Error Correction Model (ECM) approach. In this case, the sequence of steps or tests described was determined according to previous literature (Agus, 2013; Damondar et al., 2009; Winarno, 2009)).

3. RESULTS AND DISCUSSION

3.1. Stationarity Test Results

Table 1. Unit Root Test Results (in level)

	ADF value	MacKinnon's Critical Value			Prob.
		1%	5%	10%	
GDP	-0.8	-3.6	-2.9	-2.6	0.7
FCE	-2.5	-3.6	-2.9	-2.6	0.1
FDI	-2.1	-3.69	-2.9	-2.6	0.2
LFP	-1.2	-3.67	-2.9	-2.6	0.6

Source: Processed data eviews 10

Table 2. Degree of Integration Test Results (first difference)

	ADF value	MacKinnon's Critical Value			Prob.
		1%	5%	10%	
D(GDP)	-5.37	-3.68	-2.97	-2.62	0.0001
D(FCE)	-.277	-3..69	-2.97	-2.62	0.0000
D(FDI)	-6.18	-3.71	-2.98	-2.62	0.0000
D(LFP)	-4.57	-3.68	-2.97	-2.62	0.0011

Source: Processed data eviews 10

In table 1, there are stationary test results at the level or at zero or I(°) degrees. It was found that all variables did not reach their stationary point at the level. Because all ADF values for each variable are still greater than their statistical values, the probabilities for all variables are still very high. Thus, it is necessary to carry out a stationarity test at the next level, namely testing the degree of integration of the first difference. Meanwhile, all variables as in table 2 have reached their stationarity point at the first level or first difference because the ADF value is more negative than the critical value. In other words, further test can be carried out, namely the cointegration test because each variable has the same level of stationarity.

3.2. Cointegration Test Results

The cointegration test aimed to test whether the residual regression is stationary or not. This test can only be carried out if each dependent variable used in this study has the same degree of integration. In the previous test, an integration test has been carried out that each dependent variable is already at the same level of first difference.

Table 3. Johansen Contegration Regression Results

Hypothesized No. of CE(s)	Trace Statistics	0.05 Critical Value	Prob**
None *	59,366	47,856	0,002
At most 1	29,747	29,797	0,050
At most 2	10,141	15,494	0,270
At most 3	0,6743	3,8414	0,411

Source: Processed data eviews 10

In table 3, the cointegration test used is the Johansen test type. It was found that the Trace Statistic of 59.36617 has a greater value than the critical value of 5% which is only 47,85613. In addition, the probability results also show 0,0029 so that it meets the cointegrity test. To be even more certain, the cointegration test can see the residual value in the ECT test, the ECT test results get a result of 0,0202 where the value is smaller than the 5% alpha. The cointegration test above shows that the statistic 55,96781 is far > from the critical value of 5% (47,85613). In this test, the result is that the four variables are well cointegrated.

3.3. ECM Estimation Results

Table 4. Short Term Test Estimation Results

Variables	Coeff	std. Error	t-Statistics	Prob.
C	0.0625	0.0385	1.6206	0.1193
D(LOGX1)	-1.5704	0.8708	-1.8033	0.0851
D(LOGX2)	1.4730	0.9706	1.5176	0.1433
D(LOGX3)	0.3690	1.8176	0.2030	0.8410
ECT(-1)	-0.1163	0.0930	-1.2503	0.2243
R-squared	0.2419	Mean dependent var	0.0673	
Adjusted R-squared	0.1041	SD dependent var	0.2085	
SE of regression	0.1973	Akaike info criterion	-0.2418	
Sum squared residue	0.8570	Schwarz criterion	-0.0018	
Likelihood logs	8.2648	Hannan-Quinn criter.	-0.1704	
F-statistics	1.7558	Durbin-Watson stat	1.9876	
Prob(F-statistic)	0.1738			

So the short-term equation results model that is formed is as follows.

$$\widehat{\Delta Lgdp_t} = 0.173840 - 1.5704\Delta Lfce_t + 1.473093\Delta Lfdi_t + 0.369085\Delta Llfp_t - 0.116377*ECT(-1)$$

The analysis of the results of the test is that there is an F-statistic value of 1.755802 with an opportunity value of 0.173840 exceeding an alpha of 5% or 10% so that it receives H0. So it is likely that the three variables are not significant. Looking at the results of the partial test or t test, all values for each variable exceed alpha 5% and alpha 10%, so they fail to reject H0, and it is true that the results are not significant from the variables of final consumption, foreign investment and the participation rate of the female workforce on GDP per capita.

The Adj R-square value is 0.104165 so that it can be explained that the variation in the effect of GDP per capita in the short term can be explained by final consumption, foreign direct investment and the level of female participation is only around 10.4 percent, the remaining 89,6 is explained by other factors outside the equation in this research. Regarding the significance level of 5% or 10%, ECT has no significant effect on the model because it has a value of 0,22.

Table 5. Estimation Results for Long-Term Test

Dependent Variable: Y
Method: Least Squares
Date: 06/10/22 Time: 08:49
Sample (adjusted): 1991 2018
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	-6.978287	2.423846	-2.879014	0.0083
X2	-4.285176	2.438730	-1.757134	0.0916
X3	-2.360256	3.281294	-0.719306	0.4789
C	64.39533	19.84405	3.245070	0.0034

R-squared	0.555610	Mean dependent var	7.330922
Adjusted R-squared	0.500062	S.D. dependent var	0.690471
S.E. of regression	0.488207	Akaike info criterion	1.535408
Sum squared resid	5.720298	Schwarz criterion	1.725723
Log likelihood	-17.49571	Hannan-Quinn criter.	1.593589
F-statistic	10.00222	Durbin-Watson stat	0.782838
Prob(F-statistic)	0.000183		

The resulting equation is as follows.

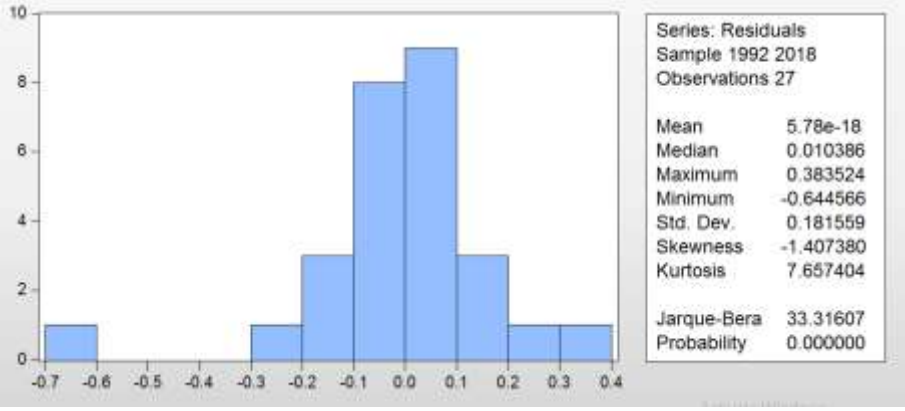
$$\widehat{\Delta Lgdp}_t = 64.39533 - 6.978287\Delta Lfce_t - 4.285176\Delta Lfdi_t - 2.360256\Delta Llfp_t$$

An explanation of the results above is that the statistical value or simultaneous test is 10,002 with an opportunity value of 0,0001, which means the opportunity is less than an alpha of 5%. In other words, H0 is rejected. Meanwhile, there is one of three variables that affect GDP per capita in the long term. From the prob value it can be seen directly that only X1 has an effect on GDP per capita. Where X1 is the final consumption. Moreover, the Adjusted R-squared value of 0,500062 or 50 percent. As such, the variation in the effect of per capita GDP in the long term can be explained by final consumption, foreign direct investment and the level of female participation is only around 50 percent, the remaining 50 is explained by other factors outside the equation in this study.

3.4. Classical Assumption Test

1) Normality Test

Table 6. Normality Test Result



The normality test aims to find out whether in the regression model studied in the residual variable there is a normal distribution or not. Namely by looking at the value of Jarque-Bera. From the results above, there is a value of 33.31607 so that it is greater than 0.05. Hence, if the normality test in this study the disturbance variables are normally distributed.

2) Autocorrelation Test

Table 7. Autocorrelation Test Result

Breusch-Godfrey Serial Correlation LM Test:			
F-statistics	0,163121	Prob. F(2,20)	0,8506
Obs*R-squared	0,433358	Prob. Chi-Square(2)	0,8052

This test aims to identify whether there is a correlation between samples. The Breusch-Godfrey test requires that the Chi-Square probability value must be greater than 0,05 or 5%. From the test results above the result is 0,8052, which means greater than 0,05. Hence, the regression model between residuals has no autocorrelation.

a) Effect of Final Consumption Expenditure (FCE) in units of % for the 1991-2020 period on Indonesia's Per Capita GDP

In the short term, it has no effect on GDP per capita. These results reject the hypothesis that FCE has a positive and significant impact on GDP per capita in Indonesia. Whereas in the long term, the hypothesis is accepted that FCE has a negative relationship but at a probability with a very small significance level of 0,008 at 5%. The reason why FCE only has an effect in the long run is that growth and changes in Final Consumption Expenditure can indirectly reduce per capita income because it has a negative coefficient. Because the significance level is quite small, which is only 0,008 at 5%, the effect of changes and growth in final consumption expenditure will only occur in the long run on the growth of GDP per capita itself.

b) Effect of Foreign Direct Investment (FDI) in % units for the 1991-2020 period on GDP per capita.

The estimation results of the Error Correction Model (ECM) show that FDI in the short term has no effect on GDP per capita in Indonesia. These results refuse to introduce the hypothesis that foreign direct investment has a positive and significant impact on GDP per capita in Indonesia. In the long run, the hypothesis is also rejected. That means changes or growth every year by foreign direct investment during the 1991-2020 period have not been able to significantly affect GDP per capita itself.

In this study, the Labor Force Participation Rate, Female (LFP) in units of % based on the population aged 15 years and over is not statistically significant in the long term or short term. Based on the resulting short-term coefficient, it has a positive value of 0.36. This means that an increase in LFPR in the short term of 1 percent leads to an increase in GDP per capita at that time. However, in the long run the coefficient of women's LFPR is negative by -2,3 percent, in which an increase in the female labor force participation

rate will actually reduce GDP per capita by 2,3 percent and this is influenced by various factors in it.

4. CONCLUSION

From various series of error correction testing methods or ECM, it states that there is no short-term effect of the three variables examined in this study on Indonesia's Per Capita GDP for the 1991-2020 period. The three variables are Final Consumption Expenditures; Foreign Direct Investment; Female Labor Force Participation Rate. However, there is a long-term effect on one variable, namely final consumption expenditure.

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