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Econometric Model of Economic Growth in Indonesia Using the SYS and FD-GMM Approach

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ABSTRACT: This study aims to determine the model of Indonesia's economic growth in 2013-2022 with dynamic panel data through the SYS-GMM and FD-GMM approaches, so that the variables that influence short-term and long-term economic growth can be identified. The research method used is quantitative descriptive analysis. The data used comes from the Central Statistics Agency of 34 provinces in Indonesia 2013-2022. This study found that economic growth was significantly positively influenced by the variables of inflation, foreign investment, and household consumption. Economic growth is significantly negatively affected by domestic investment variables, regional minimum wages, and open unemployment rates. Inflation, foreign investment, and household consumption have short-term impacts on economic growth, while domestic investment, regional minimum wages, and the open unemployment rate have long-term impacts on economic growth. Research finds economic growth is influenced by the previous year. The policy implication is that the government focuses on factors that increase economic growth.

Keywords: Economic Growth, Econometric Models, GMM

ABSTRAK: *Penelitian bertujuan menentukan model pertumbuhan ekonomi Indonesia tahun 2013-2022 dengan data panel dinamis melalui pendekatan SYS-GMM dan FD-GMM, sehingga dapat diketahui variabel yang mempengaruhi pertumbuhan ekonomi jangka pendek maupun jangka panjang. Metode penelitian yang digunakan, analisis deskriptif kuantitatif. Data yang digunakan dari badan statistik pusat 34 provinsi Indonesia tahun 2013-2022. Studi menemukan pertumbuhan ekonomi signifikan positif dipengaruhi variabel inflasi, penanaman modal asing, dan konsumsi rumah tangga. Pertumbuhan ekonomi dipengaruhi signifikan negatif variabel penanaman modal dalam negeri, upah minimum regoinal, dan tingkat pengangguran terbuka. Inflasi, penanaman modal asing, dan konsumsi rumah tangga dalam jangka pendek berpengaruh terhadap pertumbuhan ekonomi, sedangkan penanaman modal dalam negeri, upah minimum regional, dan tingkat pengangguran terbuka dalam jangka panjang berpengaruh terhadap pertumbuhan ekonomi. Penelitian menemukan pertumbuhan ekonomi dipengaruhi tahun sebelumnya. Implikasi kebijakannya, pemerintah fokus pada faktor yang meningkatkan pertumbuhan ekonomi.*

Kata Kunci: *Pertumbuhan Ekonomi, Model Ekonometrika, GMM*

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INTRODUCTION

Indonesia is a country that has diversity that varies in each region, the region stretching from Sabang to Merauke shows that Indonesia is able to compete in the economic sector (Kurniawati & Islami, 2022). Owned natural resources can encourage economic growth (Ahmed et al., 2020). His is closely related to the function of biodiversity which can provide direct or indirect benefits to the environment and the welfare of the Indonesian people (Nengsih, 2020). Even though a country has diverse resource wealth, it cannot be separated from economic problems which are things that need attention (Agustina et al., 2023). To find out how the economic condition of a country can be measured by Gross Domestic Product (GDP) (Azam, 2015). In addition, gross domestic product can be used as a measure of a country's national income and economic output (Muka et al., 2015).

Economic development in a country each year can be measured through an increase in gross domestic product (Klaus & Niklas, 2019). The development of economic growth can illustrate the real impact of development policies implemented and become one of the benchmarks in determining the success of economic development (Tumbel et al., 2018). The economic development of a country cannot be separated from regional economic growth. in measuring the economy of a region in a certain period it can be measured using Gross Regional Domestic Product (Ansari et al., 2023). Apart from that, Gross Regional Domestic Product can be an illustration of a region's economic growth (Nafi & Astuti, 2021). Gross regional domestic product is also the sum of the added value produced by all business units in a region. The higher the competence and quality of regional communities, the higher the value of a region's gross regional domestic product (Putria et al., 2023). When looking at regional economic growth, we look at the growth rate of gross domestic product at constant prices (Inglesi-Lotz, 2016). Increasing the rate of regional economic growth is one of the government's big goals in encouraging economic development (Susilo et al., 2020). The following is a graph of Indonesia's economic growth rate based on constant prices for 2018-2022.

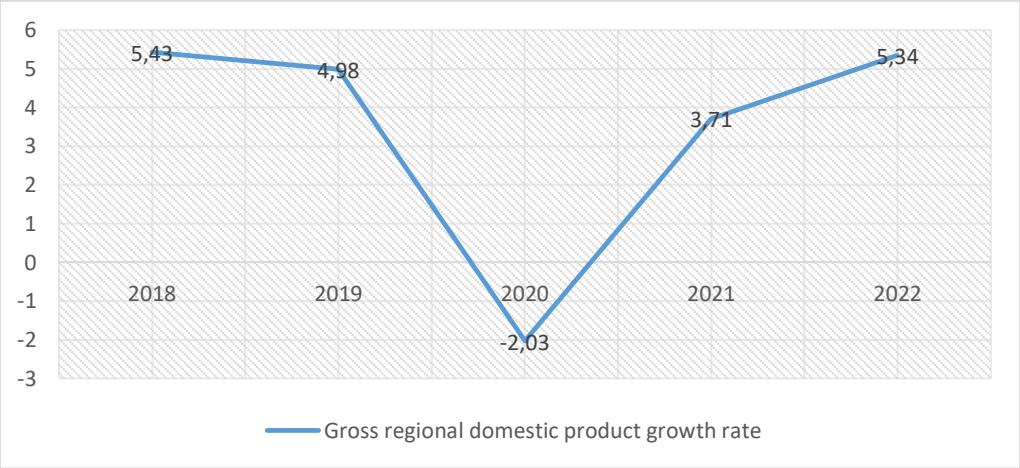

Figure 1. GRDP Growth Rate 2018-2022
Source: Central Statistics Agency (Processed Data)

Based on Figure 1 above, it can be explained that the GRDP growth rate experienced an extreme decline from 2018 to 2020. In 2018 the economic growth rate was 5.43 percent, down 0.45 percent to 4.98 percent in 2019, then in 2020 there was a drastic decline, namely 7.01 percent to -2.03. The decline was caused by the Covid-19 pandemic which has rapidly put pressure on various sectors. This extreme phenomenon triggered shocks to the global economy (Aktar et al., 2021). The impact of the Covid-19 pandemic caused the Indonesian economy to experience a drastic decline (Putri et al., 2021). There is a shift in the economic structure in gross regional domestic product due to Covid-19, it is necessary to carry out further analysis to find out sectors that have the potential to be developed in order to encourage other sectors so that they can increase stable economic growth (Assidikiyah et al., 2021). In early 2022, sustainable economic recovery, from pandemic to endemic, can be resolved, and

the Indonesian economy begins to experience growth. This momentum must be paid close attention so that growth can be maintained (Anas et al., 2022).

Based on classical economic growth theory, it pays attention to the effect of population growth on economic growth, where initially population growth will cause an increase in per capita income. However, if the population continues to increase, the law of diminishing returns will affect the production function, namely marginal production will decrease and will lead to a situation where per capita income is the same as marginal production. Furthermore, based on neo-classical theory, economic growth depends on the increase and supply of production factors as well as the level of technological progress because the economy will continue to experience full employment levels and the capacity of capital equipment will be fully utilized over time. Economic growth resulting from an increase or decrease in a country's production capacity in producing goods and services in each period can be seen through the percentage change in real gross domestic product (Reyes & Useche, 2019). Then, based on classical productivity theory, it emphasizes the importance of specialization in production and trade (Ucak, 2015). The nature of specialization depends on cheap labor complementing the production structure (Suder et al., 2015). Technological specialization as a determinant of stable international trade specialization over time (Laursen, 2015). Then, based on the theory of comparative advantage, it provides a solution that trade can occur even if a country controls all goods absolutely by exporting goods whose production is most efficient (Saragih, 2022) International trade can encourage economic growth, because each country will gain income which can increase the country's foreign exchange (Abendin & Duan, 2021). International trade activities are divided into three groups, namely exports, imports and two-way trade (Srithanpong, 2014). Exports are often considered the main determinant of production growth and employment in an economy (Volpe Martincus et al., 2017). Indirect exports are part of production because exports facilitate the import of goods, services and capital and facilitate the import of new ideas, knowledge and technology (Wang & Tao, 2019). Economic advantages for a country can be developed through certain commodities which can then be produced and exported so that they can generate foreign exchange which can contribute to the welfare of the country's economy (Saputera et al., 2023). Foreign exchange obtained through exports can then be used to import commodities that are not available domestically (Saputera et al., 2023). The Hecksher-Ohlin theory states that a country will import products/goods that use production factors that the country does not or rarely have. This activity will benefit the country compared to producing it yourself but is inefficient (Putra, 2022). A country needs import activities to obtain inputs for the production of finished goods and goods for domestic production and consumption (Aluko & Adeyeye, 2020). Imports have the potential to stimulate overall economic growth (Bangun, 2014). The impact of imports on economic growth depends on the nature of the import, if it imports consumer goods it is very unlikely to increase economic growth, but if it imports capital goods or new technology, this can encourage economic growth (Tahir et al., 2015).

International trade can encourage continued investment and be a driver of economic growth (Rodrik, 2014). Apart from international trade, a country's economic growth is influenced by high levels of capital or investment (Almfraji & Almsafir, 2014). According to classical theory, investment is an expenditure which is intended to increase the community's ability to increase production. Then based on neo-classical growth theory, the accumulation of capital goods and its relationship with people's decisions to save or invest (Arifin & Fadllan, 2021). Investment is divided into two, namely foreign investment and domestic investment. Foreign investment can encourage economic growth (Shabbir et al., 2021). Foreign investment is investment carried out by private parties in the country of origin of the capital owner, or as investment activities from a country abroad on behalf of the government of the country that owns the capital. Foreign capital flows influence the process of economic growth, both in developed and developing countries (Singhania & Saini, 2020). With foreign investment, it can create jobs so that it can reduce decline, besides foreign investment will provide new skills for developing countries. Foreign investment is also a source of savings, with foreign investors, economic growth can increase. In developing countries, foreign investment or what can also be called Foreign Direct Investment is the most stable component of capital flows (Iamsiraroj & Ulubasoglu, 2015). Foreign investment plays a role as a complement to domestic investment, in encouraging economic

growth (Omri & kahouli, 2014). Domestic Investment is investment carried out by domestic investors which aims to increase the ability to produce goods and services in the economy in the form of capital investment expenditure or company expenditure to purchase production goods. Higher economic growth also requires domestic investment (Omri & kahouli, 2014). The benefits of domestic investment are as follows: able to save foreign exchange; reducing dependence on foreign products; Encouraging the progress of domestic industry contributes to employment.

Regional minimum wages and the open unemployment rate influence the level of labor absorption, this has an impact on economic conditions (Khayati & B, 2024). Minimum wage is the minimum amount of payment that must be provided by the government or employers to workers for each hour of work or certain production. The minimum wage concept is based on the idea that workers have the right to receive fair and appropriate payment for their work. Minimum wages are regulated by law and adjusted periodically to reflect changes in the economy and cost of living. Regional minimum wages are the minimum standards used by companies to pay wages to workers (Putria et al., 2023). Regional minimum wages in Indonesia have been managed in order to raise the standard of living of workers from low wages, regional minimum wages that have been stipulated in regulations have been regulated and determined to be more than a percentage of the average salary earned by workers which can make employers reduce the number of workers which in the future absorption will decrease (Aprilya & Juliprijanto, 2022). Based on the classical theory of reducing unemployment, it is assumed that if wages fall then market demand for labor will increase. The unemployment rate is a fundamental indicator of economic performance, the unemployment rate is an indicator for foreign investors in analyzing the health of a country's economy (Ansari et al., 2023). The open unemployment rate is the number of unemployed people for the number of people in the labor force. The level of open unemployment has a big influence on the distribution of regional income disparities, low labor participation seen from the level of open unemployment which not only has an impact on welfare but also has an impact on regional development and equal distribution of income. The higher the level of open unemployment, the higher inequality will be. Apart from that, it can also weaken the economy in Indonesia because as it decreases, state income will also decrease, because national income is measured based on the percentage of total community income to the total population. Lack of income will cause a person to be unable to meet his living expenses (Hutabarat & Arka, 2023).

Inflation as an indicator of economic stability. Based on classical theory, inflation occurs due to the excessive desire of a group of people who want to use more of the goods and services available. Inflation is a symptom of the general price level experiencing a continuous increase. Inflation refers to a sustainable increase in the price level (Mohseni & Jouzaryan, 2016). The rise and fall of inflation causes the economy to experience shocks. High interest rates can cause people's purchasing power and productivity levels to decline (Moradi et al., 2021), due to the continuous increase in goods over a certain period of time and most of the raw materials used come from abroad, namely from import activities (Ginting et al., 2021). People's purchasing power will also decrease if it is not accompanied by an increase in income which causes real income to also decrease so that people's consumption also decreases. This has an impact on reducing economic growth (Almaya et al., 2016). Inflation can affect all aspects of a country through its influence on economic growth, employment, investment, distribution of income and wealth, even social and political conditions (Mohseni & Jouzaryan, 2016). High inflation can reduce unemployment, inhibiting innovation and economic growth (Chu et al., 2021). Household consumption is closely related to economic growth (Sun & Deng, 2013). Based on classical theory, inflation occurs due to the excessive desire of a group of people who want to use more of the goods and services available. Based on World Bank data, household consumption has a significant contribution to economic growth. Consumption is one of the main sources of economic growth and an indicator of social welfare (Almaya et al., 2016). A person's consumption expenditure as a share of his or her disposable income. Meanwhile, the part of income that is not spent can be called savings. If the expenditure of the entire population of a country is added up, the result is the consumption expenditure of the people of the country concerned.

Several previous study findings show the relationship between variables that economic growth is influenced by exports, imports, inflation, domestic investment, domestic investment, regional

minimum wages, household consumption, and the open unemployment rate. However, economic growth must pay attention to other macro variables that can influence economic growth. (Zahonogo, 2017) states that economic growth is influenced by export and import activities, in this study using annual data covering the years 1980 to 2012 taken from 42 sub-Saharan African countries. The dependent variable is economic growth, which is measured as the log difference of 236 gross domestic product per capita (GDP) and also includes a series of control variables commonly used in growth equations, while in this study data from 34 provinces will be used. in Indonesia with the dependent variable economic growth and the independent variables exports, imports, domestic investment, foreign investment, regional minimum wage inflation, household consumption, open unemployment rate. Foreign investment and domestic investment can influence economic growth. This research uses the Moderated Regression Analysis (MRA) method, while the research that will be carried out uses the Generalized Method of Moments (GMM) method. this is based on (Iamsiraroj, 2016). The next variables that have an influence on economic growth are inflation and household consumption, where in this study the data used is household consumption data in the shopping behavior of around 50,000 households in America during the period 2004 to 2013. Then the household consumption data in the research This comes from secondary data from the Indonesian Central Bureau of Statistics. This research is research from (Kaplan & Schulhofer-Wohl, 2016). Regional minimum wages and open unemployment rates can influence economic growth, as in research (Aprilya & Juliprijanto, 2022). shows the results of regional minimum wage variables and the open unemployment rate affecting economic growth. In this research, the method used is ECM (Error Correction Model) using the dependent variable economic growth, and the independent variables population size, minimum wage and open unemployment. Meanwhile, in the research that will be carried out, the method used is the general moment method.

Several empirical studies on economic growth in Indonesia have so far been carried out to determine the extent to which macroeconomic variables can influence economic growth in Indonesia and attempt to find the best economic model for economic growth. However, there are still limited empirical studies that analyze the short-term and long-term impacts on economic growth in Indonesia. Most studies on economic growth analysis continue to be carried out to obtain empirical results. Several previous research results found that exports, imports, inflation, domestic investment, domestic investment, regional minimum wages, household consumption, and the open unemployment rate, which influence economic growth through a multiple linear regression approach with panel data to obtain static model. Meanwhile, empirically, many economic variables have dynamic properties, meaning that the relationship between economic variables is basically dynamic, that is, variables are not only influenced by variables at the same time but also at previous times.

Based on the limitations of previous studies on economic growth, it emphasizes the need for further research with a more representative approach carried out using dynamic panel data regression with the Arellano-Bond Generalized Method of Moment (GMM) approach to model growth econometrically, economic growth in Indonesia which positions variables exogenous, namely exports, imports, domestic investment, domestic investment, inflation, regional minimum wages, household consumption, and the open unemployment rate. Then other exogenous variables as a function of economic growth. The gap from previous studies can be explained by dynamic panel data modeling which was only carried out to model economic growth in Indonesia using the FD-GMM or SYS-GMM method. So the update in this research was carried out to represent the short-term and long-term effects of economic growth as a dynamic variable through two models in the Generalized Method of Moment (GMM) Arellano-Bond (SYS and FD) and to find the best model of economic growth as a macro variable.

METHODS

The data source used is secondary data from the Indonesian Central Bureau of Statistics in 2013-2022 which covers 34 provinces. Data processing was carried out using econometric applications, namely Stata software. The dynamic panel model is explained in equation (1) below:

$$y_{i,t} = \delta\gamma_{i,t-1} + X_{i,t}\beta + u_{i.t} \quad \text{..... (1)}$$

Information :
$y_{i,t}$: i-th observation unit in period t
δ : coefficient of the explanatory endogenous variable
$X_{i,t}$: vector of observations of the dependent variable
β : vector of predictor variable coefficients
$u_{i.t}$: panel regression error for the i-th observation unit in the t-time period

The model specifications for economic growth can be seen in equation (2) as follows :.

$$lnEG_{i,t} = \beta_1 lnEXPORT_{i,t} + \beta_2 lnIMPORT_{i,t} + \beta_3 lnINFLANTION_{i,t} + \beta_4 lnDI_{i,t} + \beta_5 lnFDI_{i,t} + \beta_6 lnRMW_{i,t} + \beta_7 lnHC_{i,t} + \beta_1 lnUOR_{i,t-1} + u_{i,t} \quad \text{..... (2)}$$

Where β is the switch, x_{it} represents a matrix of size $1 \times k$ and β is a matrix of size $k \times 1$, it is assumed that $u_{i,t}$ is a one-way error component. Assume $\mu_i \sim IIDN(0, \sigma_v^2)$ and $v_{i,t} \sim IIDN(0, \sigma_v^2)$.. Dynamic panel regression model, coefficient β is the short-term effect of changes $x_{it}.\beta$ d which is the short run multiplier. Meanwhile $\left(\frac{\beta}{(1-\beta)}\right)$ is the long-term effect of changes in x_{it} or also known as the long run multiplier. The following is a simple dynamic panel regression model with the lag dependent variable as the only independent variable in the model, as follows in equation (3) :

$$y_{i,t} = \delta Y_{i,t-1} + u_{i,t} \quad \text{..... (3)}$$

The approaches used in estimating dynamic panel data regression models are first-difference GMM (FD-GMM) and system GMM (Sys-GMM), FD-GMM was developed by Arellano and Bond. This approach is used to determine the dynamic panel data model with the most perfect GMM estimates used and meets the unbiased criteria. This approach is used to determine a dynamic panel data model with the most perfect GMM estimates used, meeting the criteria for an unbiased, valid and consistent instrument. According to (Baltagi et al., 2023). says that to eliminate individual effects, first differences. With the following equation.

$$y_{i,t} - y_{i,t-1} = \delta(y_{i,t} - y_{i,t-2}) + (x_{i,t} - x_{i,t-1})$$

Parameter estimation by Arellano and Bond uses the GMM principle to obtain consistent estimates. The GMM estimate for δ is obtained by minimizing the quadratic function so that.

$$\widehat{\delta} = \left[\left(N^{-1}\sum_{i=1}^{N} Z_i \Delta y'_{i,t-1}\right)\widehat{W}\left(N^{-1}\sum_{i=1}^{N} Z_i \Delta y'_{i,t-1}\right)\right]^{-1} \left[\left(N^{-1}\sum_{i=1}^{N} Z_i \Delta y'_{i,t-1}\right)\widehat{W}\left(N^{-1}\sum_{i=1}^{N} Z_i \Delta y'_{i,t-1}\right)\right]$$

Information :
Z_i : Instrument Matrix
$\widehat{W}$: estimates are unbiased and consistent.

So as to obtain a consistent estimate for δ (efficient two step estimator by substituting the weight $\widehat{w}$ into $\widehat{\Lambda}^{-1}$ then the results of the Arellano-Bond GMM estimation are as follows in equation (4):

$$\hat{\delta} = \left[\left(N^{-1}\sum_{i=1}^{N} (\Delta y_{i,t-1} Z_{diff})\right)\hat{\Lambda}^{-1}\left(N^{-1}\sum_{i=1}^{N} (\Delta y_{i,t-1} Z_{diff})\right)\right]^{-1} \left[\left(N^{-1}\sum_{i=1}^{N} (\Delta y_{i,t-1} Z_{diff})\right)\hat{\Lambda}^{-1}\left(N^{-1}\sum_{i=1}^{N} (Z_{diff} \Delta y_i)\right)\right] \ldots\ldots\ldots\ldots (4)$$

The equation above is an unbiased, consistent, and efficient Arellano-Bond GMM estimate. Bludell-bond's system generalized method of moments (SYS-GMM) is used to estimate a system of equations by combining first difference moments with level condition moments. The following is a one step estimator system based on the equation.

$$\widehat{\delta} = \left[\left(N^{-1}\sum_{i=1}^{N} \varphi'_{i,-1}Z_{sys}\right)\widehat{W}\left(N^{-1}\sum_{i=1}^{N} Z'_{sys}\varphi_i\right)\right]^{-1} \left[\left(N^{-1}\sum_{i=1}^{N} \varphi'_{i,-1}Z_{sys}\right)\widehat{W}\left(N^{-1}\sum_{i=1}^{N} Z'_{sys}\varphi_i\right)\right]$$

Information :

Z_{sys} : Instrument Matrix

$\widehat{W}$: estimates are unbiased and consistent.

The $\hat{\delta}$ estimator is a consistent estimator that does not depend on the weights $\widehat{W}$. Blundell and Bond adapted the $\hat{\delta}$ obtained in the estimator by replacing $\widehat{W} = \widehat{\Psi}^{-1}$ with

$$\widehat{\Psi}^{-1=} N^{-1}\sum_{i=1}^{N} \hat{q}\,\hat{q}'_i\hat{\varphi}'_{i,-1}Z_{sys}$$

So, a twostep efficient system estimator is produced, namely as follows in equation (5):

$$\widehat{\delta} = \left[\left(N^{-1}\sum_{i=1}^{N} \varphi'_{i,-1}Z_{sys}\right)\widehat{\Psi}^{-1}\left(N^{-1}\sum_{i=1}^{N} Z'_{sys}\varphi_{i-1}\right)\right]^{-1} \left[\left(N^{-1}\sum_{i=1}^{N} \varphi'_{i,-1}Z_{sys}\right)\widehat{\Psi}^{-1}\left(N^{-1}\sum_{i=1}^{N} Z'_{sys}q_i\right)\right] \dots (5)$$

The estimation results of the two step efficient system estimator above are more efficient than the one step efficient system.

The use of analysis with Arellano-Bond Generalized of Moment (GMM) to estimate the parameters of complex econometric models using available data, so that the GMM model can make it easier to understand the relationship between different variables in the model and their influence on the final results and help in making decisions results.

RESULTS AND DISCUSSIONS

Estimation of Dynamic Panel Data Regression Models

At this stage, a dynamic panel data regression model is estimated using the first-difference GMM two step estimator and system GMM estimator approaches.

Table 1. Estimated Parameters of the FD-GMM Approach

variable	Coefficient	*Standard Error*	z	P Value
δ	-0.2464552	0.1719705	-1.43	0.152
$\beta 1$	6.58e-12	5.55e-10	0.01	0.991
$\beta 2$	-6.72e-10	1.87e-09	-0.36	0.720
$\beta 3$	0.1753981	0.1642161	1.07	0.285
$\beta 4$	-0.0000759	0.0000165	-4.60	0.000
$\beta 5$	0.0008537	0.0002269	3.76	0.000
$\beta 6$	-7.09e-07	4.89e-07	-1.45	0.147
$\beta 7$	2.72e-10	1.23e-09	0.22	0.825
$\beta 8$	-0.1042669	0.0545288	-1.91	0.056
Wald test	40.22			

P Value	0.0000

Source : Processed Data, 2023

In table 1 you can see the intercept and slope values for each independent variable using the FD-GMM approach. Where the intercept value is a comparison of changes in one variable to changes in other variables. Typically, this refers to the change in y for every unit change in x.

Table 2. SYS-GMM Approach Parameter Estimates

Variable	Coefficient	*Standard Error*	z	P Value
δ	-0.2168619	0.1082954	-2.00	0.036
$\beta 1$	1.33E-11	4.11e-10	0.03	0.945
$\beta 2$	-7.05E-10	1.44e-09	-0.49	0.226
$\beta 3$	0.1885066	0.053365	3.53	0.000
$\beta 4$	-0.0000765	0.0000114	-6.72	0.000
$\beta 5$	0.0007887	0.0001062	7.42	0.000
$\beta 6$	-0.931673	0.5100167	-1.83	0.002
$\beta 7$	0.0924278	0.0878931	1.05	0.041
$\beta 8$	-1.130883	0.3450338	-3.28	0.000
Wald test	129.67			
P Value	0.0000			

Source : Processed Data, 2023

In table 2 you can see the intercept and slope values for each independent variable using the SYS-GMM approach. Where the intercept value is a comparison of changes in one variable to changes in other variables. Typically, this refers to the change in y for every unit change in x.

Dynamic Panel Data Regression Model Specification Test

The model specification test was carried out using the Sargan test and Arellano Bond test as follows:

Sargan test

The Sargan test is used to determine the validity of using instrument variables (overidentifying conditions in the model). The hypothesis used is as follows:

H0: Conditions in overidentifying restrictions estimate the model is valid

H1: Conditions in overidentifying restrictions model estimation is invalid

The significance level (α) used is 0.05. The decision, making criteria is that H0 is rejected if p-value < α or s > $X^2_{L-(k+1)}$.

Table 3. Sargan test

Model	Statistical value	P-value
FD-GMM	12.45128	0.5701
Sys-GMM	13.91109	0.9742

From the estimation results in table 3, it can be seen that the statistical value of the Sargan test in the FD-GMM model is 12.45128, which is not significant with a probability value that is more than the significance level of α =5%. This shows that H0 is accepted, which means there is no correlation between error and the overidentifying restrictions value, detecting no problems with the validity of the instrument or overidentifying conditions in valid model estimation. Meanwhile, the statistical value of the SYS-GMM model sargan test is 13.911109 which is not significant with a probability value that is more than the significance level α =5%. This shows that H0 is accepted, which means there is no correlation between error and the overidentifying restrictions value, detecting no problems with the validity of the instrument or overidentifying conditions in valid model estimation.

Arellano Bond Test

The Arellano Bond test was carried out to test the consistency of estimates obtained from the GMM process. Consistent estimation means that in the second order first difference there is no autocorrelation between the residuals and the endogenous variable.

Table 4. Arellano Bond Test

Model	Statistical value	P-value
FD-GMM	-0.63886	0.5229
Sys-GMM	0.51461	0.6068

Source: Processed Data, 2023

From the estimation results in table 3, it can be seen that the statistical. The table above shows the statistical value of the Arellano-Bond test on the FD-GMM and SYS-GMM models of -0.63886 and 0.51461 respectively. with the α significance level used of 0.05, the probability values of 0.5229 and 0.6068 are more than the significance level of 0.05 so that H0 is not rejected, which means that there is no autocorrelation in the second order first difference error so the resulting estimates are consistent.

Unusual test

According to the Central Bureau Statistics of Indonesia, the expected food pattern is one of the next test is to determine the criteria for unbiasedness by comparing the dependent lags of FD-GMM and SYS-GMM with the FEM (fixed effect model) model which is biased downwards and the PLS (pooled least squares) model which is biased upwards. The unbiased lag estimator is between the FEM and PLS models. A comparison of the FD-GMM, SYS-GMM estimators with FEM and PLS can be seen in the following table.

Table 5. Comparison of FG-GMM, SYS-GMM, FEM and PLS estimators

Parameter	FD-GMM coefficients	SYS-GMM coefficients	FEM coefficient	FEM coefficient
δ	-0.24645518	-0.21686189	-0.05745023	0.00633816

Source: Processed Data, 2023

From table 5 the estimation results show that the lag coefficient value of the economic growth variable in the FD-GMM model estimation is -0.24645518 and the lag coefficient of economic growth in the SYS-GMM model is -0.21686189 which is between the lower limit coefficient -0.05745023 and the upper limit of 0.00633816 so that both models. The estimate is stated to be unbiased.

Selection of Dynamic Panel Data Models

The best model is selected based on results that meet the assumption test criteria given in the following table:

Table 6. Summary of Test Results

Criteria	FD-GMM	SYS-GMM
Sargan Test	Fulfilled	Fulfilled
Arellano-Bond Test	Fulfilled	Fulfilled
Unfamiliarity	Fulfilled	Fulfilled

Source: Processed Data, 2023

Based on table 6, the FD-GMM and SYS-GMM model estimates are stated to be fulfilled. So, because both models are declared to be fulfilled, the best model between the two can be identified by examining the smaller standard error of the two models. The standard error can be seen in the following table.

Table 7. Standard error of FD-GMM and SYS-GMM

Parameter	Standard Error FD-GMM	Standard Error SYS-GMM
δ	0.1719705	0.1082954

Based on table 7, the standard error of the lag coefficient of the FD-GMM model for the economic growth variable is 0.1719705, while the lag coefficient of the SYS-GMM model is 0.1082954. This value shows that the standard error of SYS-GMM is smaller than FD-GMM, meaning that the SYS-GMM model is the best model.

Based on the SYS-GMM approach in table 2, the SYS-GMM equation is obtained as follows:

$$EG_{i,t} = -0.2168619\ EG_{i,t-1} + 1.33E\text{-}11 EXPORT_{i,t} - 7.05E\text{-}10 IMPORT_{i,t} + 0.1885066 INFLATION_{i,t} - 0.0000765 DI_{i,t} + 0.0007887 FDI_{i,t} - 0.931673 RMW_{i,t} + 0.0924278 HC_{i,t} - 1.130883 UOR_{i,t} + \varepsilon_{i,t}$$

The value δ = -0.2168619 explains that if there is an increase in economic growth in the previous period by one unit, it will reduce economic growth by -0.2168619 units. The value $\beta 1$ = 1.33E-11 indicates that economic growth increases by 1.33E-11 units for every increase in exports. The value $\beta 2$= -7.05E-10 means that every increase in imports can reduce the value of economic growth by one unit. The value $\beta 3$= 0.1885066 indicates that economic growth increases by 0.1885066 units for every increase in inflation. The value $\beta 4$ = -0.0000765 means that every increase in foreign investment can reduce the value of economic growth by one unit. The value $\beta 5$= 0.0007887 indicates that economic growth increases by 0.0007887 units for every increase in domestic investment. The value $\beta 6$ = -0.931673 means that every increase in the regional minimum wage can reduce the value of economic growth by one unit. The value $\beta 7$= 0.0924278 indicates that economic growth increases by 0.0924278 units for every increase in household consumption. The value $\beta 8$= - 1.130883 means that every increase in the open unemployment rate can reduce the value of economic growth by one unit.

Regression Elasticity Coefficient

Dynamic panel data regression is a method that can be used to determine the short-term (short-run multiplier) and long-term (long-run multiplier) effects of endogenous variables. Table 7 below shows the short-term and long-term elasticity coefficients for variables that influence the level of economic growth based on the SYS-GMM Blundell Bond model.

Table 8. Short-Term and Long-Term Elasticity

Variable	Coefficient	Standard Error	Z	P Value	Short-Run Elasticity	Long Term Elasticity
Economic growth	-0.2168619	0.1082954	-2.00	0.036	-	-
Export	1.33E-11	4.11e-10	0.03	0.945	1.33E-11	1.09e-11
Import	-7.05E-10	1.44e-09	-0.49	0.226	-7.05E-10	-5.80e-10
Inflation	0.1885066	0.053365	3.53	0.000	0.1885066	0.1549121
DI	-0.0000765	0.0000114	-6.72	0.000	-0.0000765	-0.0000629
FDI	0.0007887	0.0001062	7.42	0.000	0.0007887	0.0006481
RMW	-0.931673	0.5100167	-1.83	0.002	-0.931673	-0.7656357
HC	0.0924278	0.0878931	1.05	0.041	0.0924278	0.0759559
OUR	-1.130883	0.3450338	-3.28	0.000	-1.130883	-0.9293435

Source: Processed Data, 2023

Based on table 8 above, it can be seen that the lag coefficient of the economic growth indicator has a negative and statistically significant effect. Thus, it can be interpreted that the economic growth of the previous period has an influence on the current economic growth in this research. The model found that the research results show that exports have no effect on economic growth in Indonesia, with a probability value of 0.945, this value is greater than the alpha level of 5% or 0.05 and a positive regression coefficient of 1.33E-11. This shows that every 1% increase in the value of economic growth

will increase exports in the short term by 1.33E-11 and in the long term by 1.09e-11, so it can be concluded that the increase in exports on economic growth in the short term is greater than the effect long-term. This is in line with research from (Eduward, 2022) which shows that exports have no effect on the economic growth of North Sumatra. Apart from that, it is also in line with (Rizkiana, 2022) research which states that exports have no effect on economic growth. The results of this research analysis are in line with the neo-classical theory of exogenous economic growth which explains that the role of exports has no effect on economic growth because according to neo-classical theory, the factors that influence economic growth are production inputs such as capital and labor as well as technological progress.

Imports do not have a significant effect on economic growth in Indonesia with a probability value of 0.226 and a coefficient of -7.05E-10, the probability value is greater than the alpha level of 0.05, the negative regression coefficient shows that every 1% increase in the value of economic growth will reduce imports in the short term by - 7.05E-10 and in the long term it is -5.80e-10, so it can be concluded that the increase in imports on economic growth in the long term is greater than the long term effect. This is in line with research from (Eduward, 2022) which shows the results that imports have no effect on the economic growth of North Sumatra. Apart from that, it is also in line with (Rizkiana, 2022) research which states that imports have no effect on economic growth. This is different from the Hecksher-Ohlin theory which states that a country will import products/goods that use production factors that the country does not or rarely have. This activity will benefit the country compared to carrying out its own production but is inefficient.

Inflation has a probability value of 0.000 which is smaller at a significance of 0.05 and a coefficient of 0.1885066, which means that the inflation variable has a significant positive effect on economic growth in Indonesia, which means that an increase in inflation of 1% can increase economic growth by 0.1885066 in the short term, while in the long term it will increased by 0.1549121, so it can be concluded that the short-term effect of increasing inflation on economic growth is greater than the long-term effect. This is in line with previous research by (Kartika & Pasaribu, 2023). In quantity theory, which is a theory related to inflation, which explains the problem of inflation in developing countries. 2020-2021 is the year with the lowest level of inflation caused by Covid-19 which is related to quantity theory where the government takes a fiscal deficit budget policy to anticipate economic growth which actually causes state debt to increase with the risk that inflation will be large enough in the future so that it can has a significant impact on economic growth. There is also (Simanungkalit, 2020) research which states that inflation has an effect on economic growth. Inflation has positive and negative impacts on the economy. If the country's economy declines, Bank Indonesia can implement expansionary monetary policy by reducing interest rates. High and fluctuating inflation reflects economic instability which results in a general and continuous increase in the price level of goods and services, thus leading to an increase in poverty rates in Indonesia. As a result of increasing inflation, people who were previously able to meet their daily needs with high prices for goods and services are unable to meet their needs, poverty is increasing and Indonesia's inflation is increasing from year to year.

Domestic investment has a partial negative effect on economic growth. Aimed at a coefficient of -0.0000765 and a p value of 0.000 which is smaller than the significance of 0.05. This negative relationship shows that if there is an increase in domestic investment of 1% then in the short term it will reduce economic growth by -0.0000765 and in the long term by -0.0000629, so it can be concluded that an increase in domestic investment will have a long-term effect on economic growth. greater than the short-term effects. This is in line with research (Yuliantari et al., 2016) which shows that domestic investment has a significant negative effect on economic growth in East Kalimantan, which means that if domestic investment increases, economic growth will decrease. Apart from that, it is also supported by (Meilaniwati & Tannia, 2021) research which states that domestic investment has a significant effect on economic growth. Domestic Investment is a source of funds or capital originating from within the country to help develop domestic projects so that it will help the process of domestic economic growth. With domestic investment, it can provide facilities and infrastructure for the sustainability of

domestic projects, thus encouraging the country's economic growth and reducing dependence on other countries.

The results of the foreign investment indicator have a probability of 0.000 which is smaller than the significance of 0.05 with a coefficient of 0.0007887, so it can be concluded that foreign investment has a positive and significant effect on economic growth in Indonesia. Foreign investment has a short-term effect elasticity of 0.0007887 and a long-term effect elasticity of 0.0006481. This shows that for every 1% increase in foreign investment, there will be an increase in short-term economic growth of 0.0007887, so it can be concluded that the increase in foreign investment on economic growth in the short-term effect is greater than the long-term effect. This is in line with previous research by (Iamsiraroj, 2016) shows that foreign investment has a significant positive influence on economic growth. The relationship between foreign investment and economic growth depends on several things, an increase in foreign investment that is evenly distributed nationally will increase economic growth. Apart from that, it is also supported (Meilaniwati & Tannia, 2021) research which states that foreigners have a significant influence on economic growth. Foreign investment is a source of funds or capital originating from abroad to help develop domestic projects so that it will help the process of economic growth in the country. Foreign investment can provide facilities and infrastructure for the sustainability of domestic projects, thereby encouraging the country's economic growth.

The regional minimum wage has a significant and negative effect in the short and long term on economic growth in Indonesia, this can be seen from the short-term probability value of 0.002 and the long-term probability value of 0.000 which is smaller at a significance of 0.05, with a coefficient of -0.931673. This means that if the regional minimum wage increases by 1%, economic growth will decrease by -0.931673 in the short term and decrease by -0.7656357 in the long term, so it can be concluded that an increase in the regional minimum wage on economic growth in the long term is greater than the short-term effect. This is in line with previous research by (Aprilya & Juliprijanto, 2022) which shows that the regional minimum wage has a significant negative effect on economic growth, which means that if the regional minimum wage decreases, economic growth will increase. Apart from that, it is also supported by research from (Julianto & Suparno, 2016) which states that the minimum wage has an effect on economic growth. An increase in workers' minimum wages will increase their purchasing power which will ultimately boost work morale and increase work productivity. However, for entrepreneurs who consider wages as a cost, this increase causes them to have to adjust the amount of wages that must be given to workers with the minimum wage level set by the government.

Household consumption has a positive and significant influence on short-term and long-term economic growth, this can be seen from the short-term probability level of 0.041 and the long-term probability of 0.050, which is smaller at a significance of 0.05 with a coefficient of 0.0924278. This means that if household consumption increases by 1%, economic growth will increase by 0.0924278 in the short term and increase by 0.0759559 in the long term, so it can be concluded that the increase in household consumption on economic growth in the short term is greater than the long-term effect. This is in line with previous research by (Yusup & Istiqomah, 2022) shows that household consumption has a significant positive effect on economic growth. Basically, economic growth can be seen from the total national income which is obtained from the sum of aggregate demand which consists of four real sectors, namely consumption (C), investment (I), government expenditure (G), as well as the export (X) and import (M) sectors. Apart from that, it is also supported by (Julianto & Suparno, 2016) research which states that household consumption influences economic growth. based on the classical assumption theory put forward by Keynes, namely the theory of absolute consumption which is called Keynesian Consumption Theory (absolute income hypothesis). Keynes argued that the amount of household consumption depends on the income generated. Keynes called the ratio between total consumption and income the Marginal Propensity to Consume (MPC). This MPC is used to measure that the greater the income, the higher the level of household consumption, and vice versa.

The open unemployment rate has a significant and negative effect on economic growth in Indonesia, this can be seen from the probability value of 0.000 which is smaller at a significance of 0.05, with a coefficient of -1.130883. This means that if the open unemployment rate rises by 1%, economic growth will decrease by -1.130883 in the short term and decrease by -0.9293435 in the long

term. So, it can be concluded that an increase in the level of open unemployment on economic growth has a greater long-term effect than the short-term effect. This is certainly in line with previous research by (Mohseni & Jouzaryan, 2016) shows that the open unemployment rate has a significant negative effect on economic growth. Apart from that, it is also supported by (Padang & Murtala, 2020) research which states that the level of open unemployment affects economic growth. The problem of unemployment can cause the level of national income and the level of social welfare to not reach its maximum potential, which is a major macroeconomic problem. Unemployment is a very complex problem because it is influenced and influenced by various factors that interact with each other following patterns that are not always easy to understand.

Based on Okun's theory which states that there is a negative relationship between economic growth and unemployment, where if the economy grows by 2.5% above its trend, which has been achieved in a certain year, the unemployment rate will fall by 1%. When economic growth is higher, it will stimulate the joints of the economy. Economic growth that shows a positive trend will also encourage investors to enter. This will allow the opening of new jobs so that it will have an impact on the employment sector, and unemployment will be reduced.

The Arellano bond moment analysis method was carried out because empirically many economic variables have dynamic properties, which means that variable values can be influenced by other variables and influenced by the values of relevant variables in the previous period. The results of the analysis show that the variables that influenced economic growth in Indonesia in the previous period influenced the level of economic growth in Indonesia, with increases aimed at long-term and short-term influences. In this research, it was found that the level of economic growth this year in the research was influenced by influential variables and the previous year's economic growth. The increase in economic growth in Indonesia is largely determined by the role of other variables and the level of economic growth in the previous year.

CONCLUSION

Based on the findings of data analysis and discussion in the research, it can be concluded that the economic growth variable in Indonesia is influenced by six independent variable coefficients at once, namely domestic investment, domestic investment, inflation, regional minimum wage, household consumption, and open unemployment rate. Economic growth is also influenced in the long term and short term. In the long term, economic growth is influenced by domestic investment, regional minimum wages, and the level of open unemployment, while in the long term, economic growth is influenced by inflation, foreign investment, and household consumption. Apart from that, the lag in economic growth also has a significant negative effect on economic growth. Thus, it can be concluded that economic growth in year t was dominated by growth in the previous year.

Based on empirical findings, research can increase understanding of economic growth problems and the factors that influence economic growth. The policy implication is that the government or related institutions can focus more on factors that can increase economic growth. Economic growth as an indicator of the success of economic development. Welfare and economic progress are determined by the amount of growth indicated by changes in national output. In future research, data from the research time period up to 2023 can be used because the data for that year has not been published in full. Further research can also examine other variables that can influence economic growth

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