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Dynamic panel data modeling of Indonesia's poverty level 2013-2022

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Abstract: Poverty in Indonesia is a problem that needs special attention by the government. Poverty is due to the high level of inequality, unequal distribution of income, and the number of poor people, which continue to increase. Therefore, it can affect society's economy. This research aims to identify incongruities between endogenous and exogenous variables that influence poverty levels in Indonesia. By applying a descriptive quantitative analysis approach for 2013-2022 in the form of secondary data from the Indonesian Central Statistics Agency, the research model uses dynamic panel data regression analysis based on the Generalized Method Of Moment method (GMM). The method was developed by Arellano-Bond, of which the two best models are First-Difference GMM and System GMM, which create an impartial, consistent, and efficient model for determining short-term and long-term effects. The research results show that HDI has a significant negative impact on short-term and long-term relationships with poverty levels, resulting in low human resources. Exports have a significant negative impact on poverty levels in the short and long term. This means that if exports increase, poverty levels can be reduced. Imports have a significant positive impact on short-term and long-term with poverty levels. In import activities, the higher the price increases, the more people's purchasing power decreases. The results are declared to have a significant effect because the p-value is < significance of level 5% or 0.05. It is expected that the research will become reference material for macroeconomic development and further research regarding poverty alleviation.

Keywords: Macroeconomics; Poverty; Short-term; Long-term; GMM

JEL Classification: C01; O1; O11



Introduction

The problem of poverty in Indonesia is very important not only because of its increasing trend, but also because of its economic scope and impact. Poverty is the degree of material poverty experienced by a person compared to the general standard of living of society. Low living standards affect the level of social life (Andrean et al., 2023). The problems are complex and multidimensional and a development priority must be made, one of which is the problem of poverty. The poverty line is an indicator used to measure the success and effectiveness of development services implemented by the government (Melayanti & Indrajaya, 2021).

One of the causes of the problem of poverty in Indonesia today is the high level of inequality in various regions and community groups. This is caused by unequal distribution of income and the number of poor people, which continues to increase until it reaches the poverty line (Buheji et al., 2020). Poverty is a very low standard of living, a level of material deprivation experienced by a group of people compared to the standard of living of society in general. This has an impact on standards of health, education, and social life.

Even though the government itself is promoting a strategy to reduce poverty rates from year to year, according to the Central Statistics Agency (2022), the poverty rate has not changed and has not experienced a significant decline. There has been a qualitative decline, but the impact of the change has not been proven. In fact, the situation is increasingly worrying. Poverty can also be seen from other dimensions, such as health, nutrition, education, and inadequate literacy levels, which are used to measure the poverty line. From an economic perspective, instead of using one dimension, the overall welfare index is simply a combination of consumption (economic), education, and health spending (Wibowo & Setyowati, 2023). The cause of poverty occurs due to several factors, namely inadequate minimum wages, poor living standards, and the unemployment rate, which increases every year, but there are no jobs available. The Central Statistics Agency notes that the poverty level in 2018-2022 is as follows.

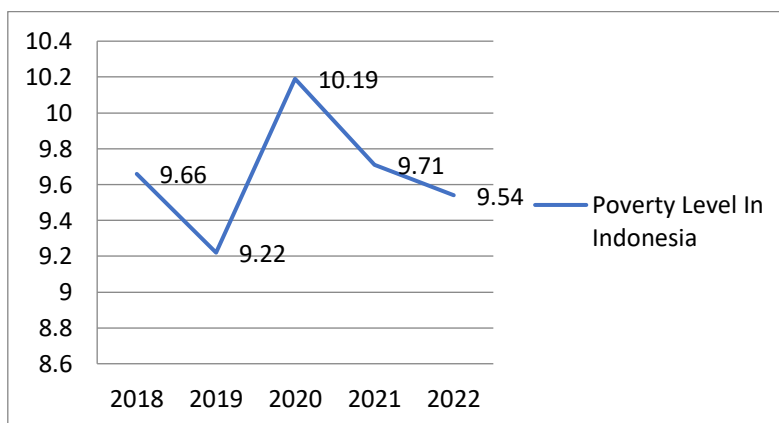


Figure 1 Poverty Level in Indonesia

Source: Indonesian BPS Processed Data, (2023)

Figure 1 shows that the percentage of poverty levels in Indonesia from 2018 to 2019 has decreased. In 2018 the poverty rate in Indonesia was 9.66%, and it decreased to 9.22% in 2019. Furthermore, in 2020, there was an increase of 10.19 or 0.97% from 2019. The number of people living in poverty in Indonesia in 2020 experienced a sharp increase due to the effects of the global COVID-19 pandemic, so it had quite a big impact on the community's economy. Then, from 2021 to 2022, the poverty level will decrease so that poverty is classified as quite good and stable in all provinces in Indonesia. However, in reality, current poverty has not yet shown any change in poor communities in every region. So, the Indonesian government needs to pay more attention as efforts to

overcome the emergence of new poverty. The problem of poverty in Indonesia generally dominates underdeveloped rural areas (Wau, 2022).

Empirically, the Central Statistics Agency (2023) announced that the poverty rate has decreased to pre-pandemic levels and the trade balance surplus is still continuing. Central Statistics Agency (2016) operationally stated poverty from an economic perspective is the inability to fulfill basic needs, which is calculated by averaging monthly per capita expenditure levels below the poverty line, for both food and non-food. According to Davis and Sanchez-Martinez (2014) poverty is a very relative main concept that is useful for analyzing a problem. The poverty that occurs in Indonesia can influence several factors, such as the open unemployment rate, exports, and imports. Increasing poverty will reduce the electability of the Human Development Index. Increasing poverty is the impact of decreasing economic electability; human development, and human development is one measure of the success of increasing community welfare (Susilo et al., 2023). Human development is an important factor in the economic development of a country, so human quality can make a full contribution to economic development (Anwar, 2018). The Human Development Index is a tool used to assess or measure the level of development in a country in the process of change in order to improve people's living standards. The Human Development Index helps measure the level of achievement in a country in various fields, namely health, education, living standards (Roshaniza & Selvaratnam, 2015). In the development process, increasing the population in Indonesia is very crucial every year (Ilham, 2021). Human development has not been balanced with the amount of population available, resulting in economic development being hampered.

The population is a problem for the economy because if it is not addressed immediately, it will cause economic instability in a country. Population stability is very important in economic development so it will improve community welfare. A large population will lead to poverty due to high unemployment. If the poor are not favored by providing decent employment, then the number of poor will increase, and as a result, the welfare of the community will decrease (Hidayat et al., 2023). Improving the quality of human resources is one solution to increase capital (Yusuf et al., 2020). The increase in population will result in an increase in the workforce.

The total workforce is a population that has entered productive age with an age range of 15 to 64 years. Employees are people who are able to carry out work successfully inside or outside of work to produce goods and services that are used daily (Zid. M *et al.*, 2020). Labor force mobility leads to the creation of pockets of individuals who are innovative and mutually interested in each other aimed at building innovative cities, leading the economy to prosperity (Grebski, 2021). Social influences include the experience of unemployment, the job placement process, and poverty in groups of people who are still disadvantaged (Thompson & Dahling, 2019). Apart from employment problems in Indonesia, there is also the problem of low regional minimum wages, both directly and indirectly. The increase in capital goods due to investment can expand employment opportunities, which will affect the level of wages and income (Murniati, 2021).

Wages are compensation received by a unit of labor in the form of money given to it. The minimum wage is set by the government to create a standard of living that is regulated in policy so that it is able to help low-income workers so that the minimum wage is able to help reduce poverty and maintain a minimum standard of living (Syarif & Wibowo, 2017). The Regional Minimum Wage applies to all regions, both Regency and City, but it still has limitations in determining it in all regions of Indonesia that have their own Minimum Wage provisions (Sari, 2018). The phenomenon of household consumption patterns that occur in Indonesia still tends to be low. However, there is still a positive recovery rate. The Central Statistics Agency (2020) stated that low household consumption was due to the global COVID-19 pandemic, which had an impact on people's income. Disposable income is the main factor that determines the level of consumer spending, permanent and life cycle income, and wealth, as well as other determining factors such as expectations of society and future conditions (Hardiani et al., 2018). It is known that household consumption or aggregate income needs to be normalized to determine differences in the cost of living standards (Ravallion. M, 2012). Declining household consumption patterns will also have an impact on the unemployment rate so economic conditions will become increasingly uncontrollable.

The unemployment rate is a main indicator that is very important in determining community policy. The open unemployment rate is an indicator used to measure labor force performance and the ratio of the number of unemployed available to the labor force (Choirur et al., 2021). Agustina et al., (2023) stated that the unemployment rate in Indonesia tends to be flat or has not experienced any change in hamper. However, from 2020 to 2021, there was a high increase in unemployment, so it could not keep up with the number of existing jobs; this was caused by the Covid-19 pandemic. The problem of unemployment arises because there is an imbalance in the number of workers and a lack of job opportunities (Endang, 2022). Foreign investors are interested in investing their capital in Indonesia with the hope that potential development in Indonesia in the future will be better (Jamil & Hayati, 2020).

Foreign investment is capital owned by foreign countries, individual foreign citizens, foreign business entities, foreign legal entities, and Indonesian legal entities. Part or all of the capital is used to open a business in a country. On the other hand, foreign investment can encourage poverty alleviation through economic growth, which has an impact on the development of living ethics due to increased income. The relationship between foreign investment and poverty alleviation is seen from two parts, namely growth on the other hand and growth on the other hand, poverty alleviation. In general, FDI has promoted faster economic growth in the country and a higher standard of living, which has resulted in more poverty reduction in the country (Shamim et al., 2014). Israel (2014) states that in Indonesia, there is a paradox of foreign investment inflows, which will reduce the impact of poverty so that foreign investment inflows can last longer. In terms of investment, Indonesia is one of the largest exporting countries in ASEAN.

Exports are important benchmarks for marketing Indonesian products abroad and increasing the country's foreign exchange to sell goods to people abroad so that transactions can increase foreign exchange demand. There are some export potentials

that can be utilized for sustainable growth and development, but there are countries where the growth rate is almost stagnant and does not exceed it. Exports are an effort to sell goods made to foreign countries that can anticipate payment in another currency (Safitri et al., 2023). Exports of products are mainly agricultural and petroleum, which can be expected to play a fundamental role in driving a country's economy (Ofeh, 2014). Indonesia's export stability is still able to maintain and control the level of price stability (Novalina & Rusiadi, 2018). Apart from export activities, which involve the removal of goods from the Indonesian customs area to the customs area of other countries, there are also import activities, which involve importing goods from abroad into the Indonesian customs area. Thus, export and import activities are carried out in accordance with applicable statutory provisions.

Imports are important parts of international trade, which are useful for filling gaps in goods or services that cannot be produced by the country itself, for example, sophisticated machine tools owned by factories or goods processing companies. Import tariffs in a country can affect imports in that country; these tariffs will also affect exports in that country. Reducing export freight rates to trading partners driven by lower import rates if exports to trading partners increase (Hayakawa et al., 2020).

Previous studies also stated that the relationship between the macroeconomic variables HDI, Regional Minimum Wage, and Unemployment has an influence on the level of poverty. Subanidja and Suharto (2014) explains that HDI has a significant influence on poverty levels in Indonesia. Safitri et al. (2023), in their research, show that the relationship between unemployment and poverty can have a significant effect. Previous research shows that the unemployment rate has a significant positive impact on the poverty rate (Sedana Y. I.M *et al.*, 2019). Nabila. R. (2021) states that there is a relationship between the human development index variable and the unemployment rate which does not have a negative influence on the poverty rate in Indonesia. Faharuddin and Endrawati (2022) study shows that household consumption contributes significantly to poverty in Indonesia. Adha et al., (2018) stated that the Labor Force has a significant positive influence on poverty. Endang and Susilo (2022) revealed that the poverty level and human development index simultaneously influence economic growth and do not have a short-term or long-term elasticity relationship.

Previous research found that unemployment, the Human Development Index, and GRDP have an impact on poverty levels through a multiple linear regression model approach and panel data to obtain a static model. Empirically, there are economic variables that are dynamic between economic variables, which are influenced not only at the same time but also at an earlier point in time. Based on the results of previous research, several factors that determine the magnitude of poverty in Indonesia are analyzed. Setiawan A.B & Adzim. F (2017) believes that the determining characteristics of poverty in Indonesia are the average expenditure and foreign investment, which can have a significant influence on poverty in 2014. The cause of this is the political conditions, and economic conditions in the country which are undergoing adaptation, and conditions in the global economy are increasingly improving. De Silva and Sumarto (2015) show that poor areas often do not have the same opportunities to get immunization protection.

With this, their abilities decrease due to poor health conditions and the benefits of educational capacity level opportunities. In reality, human resources greatly influence poverty, but they will contribute to poverty alleviation which will increase the rate of economic growth.

Based on the background, this research aims to determine the degree of poverty where there is a lag influence relationship between endogenous variables and exogenous variables using Dynamic Panel Data Regression through a model approach of Generalized Methods of Moment (GMM) Arellano-Bond to find the best model in Poverty Level testing. In econometrics, this model can clarify and analyze a problem. Thus, the model applied will produce unbiased, consistent, and efficient estimates that can be used to interpret the parameters of the simultaneous equation model in determining the relationship between short-term and long-term impacts as well as the positive response of each variable to shocks to other variables. Arellano-Bond (1991) GMM states that it is a dynamic panel data technique that is commonly used to analyze relationships between dynamic variables. This research uses several exogenous variables, namely the Human Development Index, Population, Number of Labor Force, Regional Minimum Wage, Household Consumption, Open Unemployment Rate, Foreign Investment, Exports, and Imports. To overcome the gap in previous research by applying a multiple linear regression model approach, it is briefly stated that there is a balanced relationship between the human development index and unemployment variables that influence poverty by applying the Multiple Linear Regression model approach (Nabila. R 2021).

The latest study of this research was conducted to analyze short-term and long-term relationships of the poverty level as a dynamic variable through the two best models *Generalized Methods Of Moment (GMM) Arellano-Bond that is First-Difference (FD)*, *GMM*, and *System (SYS)-GMM* so that we can find the best model for macroeconomic variables. However, this study focuses on a group of poor people in each region whose poverty rate tends to remain relatively high, so that it cannot balance income levels. This is interesting to research so that the poverty rate in Indonesia decreases. It is hoped that the findings of this study can become a further reference for decision-making in efforts to eradicate poverty in Indonesia.

Research Method

This research uses descriptive quantitative analysis consisting of samples and numerical data. Quantitative descriptive focuses on measuring or analyzing research variables numerically using statistical analysis tools with a time span of 10 years from 2013-2022, sourced from 34 provinces in Indonesia with 340 observations. Obtained from the Indonesian Central Bureau of Statistics which uses secondary data. The dynamic panel data model is explained in equation:

$$y_{i,t} = \delta y_{i,t-1} + x_{i,t} \beta + u_{i,t}$$

The poverty level model specifications are as follows:

$$Pov_{i,t} = \alpha_1 IPM_{i,t} + \alpha_2 JP_{i,t} + \alpha_3 JAK_{i,t} + \alpha_4 UMR_{i,t} + \alpha_5 KRT_{i,t} + \alpha_6 TPT_{i,t} + \alpha_7 PMA_{i,t} + \alpha_8 EX_{i,t} + \alpha_9 IM_{i,t}$$

Where δ is a toggle $x_{i,t}$ represents a matrix with dimensions $1 \times k$ and β with a size matrix $k \times 1$, it is expected that $u_{i,t}$ is the component of one-way error. The assumption is that $\mu_i \sim IIDN(0, \sigma_u^2)$ and $v_{i,t} \sim IIDN(0, \sigma_v^2)$. The coefficient in dynamic panel data regression represents the short-term start of change $x_{dfa} \beta$ is known as the short-run multiplier. In the meantime, $\left(\frac{\beta}{(1-\beta)}\right)$ is the long-term consequence of change x_{dia} . Alternatively, a long-term multiplier. The lag-dependent variable is the sole variable that is independent in the following fundamental model for flexible panel regression, forming a dynamic panel data model:

$$y_{i,t} = \delta y_{i,t-1} + u_{i,t}$$

Regarding the initial disparity in calculating dynamic panel data regression models, two approaches are used: *First Difference GMM* (FD-GMM) and *System GMM* (Sys-GMM). FD-GMM was invented by Arellano-Bond. This method is used to generate a dynamic panel data model with the best GMM estimates that are unbiased, valid, and unchanged. The first distinction is illustrated by the following equation.

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

Arellano and Bond's estimation of variables method uses the GMM principle to get unchanged predictions. δ is derived from the GMM estimator by reducing a quadratic function in such a way that equation (2);

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

As a result, a rough estimate is produced δ a two-step efficient estimator that is substitution-compatible \widehat{W} weight $\widehat{\Lambda}^{-1}$. The Arellano-Bond GMM estimate is then calculated in the equation as follows (3):

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

The equation provides an unbiased, consistent, and efficient estimate of the Arellano-Bond GMM. First difference moments and level state moments are utilized to calculate

the structure of equations using the Blundel-Bond System Generalized Method of Moment or the SYS-GMM. The following is a one-step estimation system for Eq: (4).

$$\hat{\delta} = \left[\begin{pmatrix} N^{-1} \sum_{i=1}^N \phi'_{i,-1} Z_{sys} \\ \left(N^{-1} \sum_{i=1}^N \phi'_{i,-1} Z_{sys} \right) \widehat{W} \left(N^{-1} \sum_{i=1}^N Z'_{sys} \phi_i \right) \end{pmatrix} \right]^{-1} \begin{pmatrix} N^{-1} \sum_{i=1}^N \phi'_{i,-1} Z_{sys} \\ \left(N^{-1} \sum_{i=1}^N \phi'_{i,-1} Z_{sys} \right) \widehat{W} \left(N^{-1} \sum_{i=1}^N Z'_{sys} \phi_i \right) \end{pmatrix}$$

Estimates $\hat{\delta}$ is a constant estimator that does not change with weights \widehat{W} . Blundell dan Bond adapt $\hat{\delta}$ obtained through replacement from the estimator $\widehat{W} = \varphi^{-1}$ on:

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

As a result, a *two-step efficient system estimator* can be generated, as shown in equation (5):

$$\hat{\delta} = \left[\begin{pmatrix} N^{-1} \sum_{i=1}^N \phi'_{i,-1} Z_{sys} \\ \left(N^{-1} \sum_{i=1}^N \phi'_{i,-1} Z_{sys} \right) \widehat{\Psi}^{-1} \left(N^{-1} \sum_{i=1}^N Z'_{sys} \phi_{i-1} \right) \end{pmatrix} \right]^{-1} \begin{pmatrix} N^{-1} \sum_{i=1}^N \phi'_{i,-1} Z_{sys} \\ \left(N^{-1} \sum_{i=1}^N \phi'_{i,-1} Z_{sys} \right) \widehat{\Psi}^{-1} \sum_{i=1}^N Z'_{sys} q_i \end{pmatrix}$$

The above-discussed *two-step efficient system estimator* yields greater effectiveness in estimation outcomes compared with the *one-step efficient system estimator*.

The process of estimating the coefficients for intricate econometric models using the Arellano-Bond generalized method of moments (GMM) assessment using data that is accessible. This allows the GMM model to help comprehend the connection between multiple parameters and how they affect the outcome, which may assist with decision-making processes.

Result and Discussion

Estimation of Dynamic Panel Data Regression Models

This research applies a dynamic panel of data regression estimation, comparing the first-difference GMM and system GMM approaches. The intercept and slope values for each independent variable using the first-difference GMM and system GMM approaches have been presented in the Table 1.

Table 1 FD-GMM Arellano-Bond Models

Predictor	Coefficient	Standard error	Z	P-Value
POV L1.	0.0000000896	0.0000000452	0.20	0.843
IPM	-0.0798176	0.3552985	-0.22	0.822
JP	-0.8715838	3.859787	-0.23	0.821
JAK	-0.000000418	0.0000000532	-0.80	0.425
UMR	-0.000000271	0.000000454	-0.60	0.550
KRT	-0.0000000143	0.0000000537	-0.27	0.790
TPT	-0.8260852	0.1396161	-5.92	0.000
PMA	0.0003779	0.0003212	1.18	0.239
EXP	-0.1768614	0.1758201	-1.01	0.314
IMP	1	0.000000446	0.00000022	0.000

Based on the test results in Table 1, it shows the intercept and slope values for each exogenous variable using the FD-GMM approach model, if the probability value is above 5% then it is declared to have no influence. Meanwhile, a probability value below 5% is declared influential, which can be presented in table 1 (1.) The poverty variable L1 (Lag) has a probability value of 0.843, which means that the test results have no influence on the FD-GMM model. (2.) HDI has a probability value of 0.822. It can be concluded that the HDI variable does not have a negative influence on poverty. (3.) The population variable does not have a negative effect on poverty because the probability value is $0.821 > 0.05$. (4.) The number of labor force does not have a negative influence on poverty because the probability value is $0.425 > 0.05$. (5.) UMR has a probability value of $0.550 > 0.05$; it can be concluded that the UMR variable does not have a negative influence on poverty. (6.) The KRT variable does not have a negative effect on poverty because the probability value is $0.790 > 0.05$. (7.) The TPT variable has a negative influence on poverty because the probability value is $0.000 < 0.05$. (8.) PMA has a probability value of $0.239 > 0.05$, and it can be concluded that the PMA variable does not have a positive influence on poverty. (9.) Exports have a probability value of $0.314 > 0.05$, and it can be concluded that the Export variable does not have a positive influence on poverty. (10.) The import variable has a positive influence on poverty because the probability value is $0.000 < 0.05$.

Table 2 SYS-GMM Blundell and Bond models

Predictor	Coefficient	Standard error	Z	P-value
POV L1.	0.000000338	0.000000263	1.28	0.199
IPM	0.1442297	0.1448081	1.00	0.319
JP	1.694976	1.134243	1.49	0.135
JAK	-0.000000044	0.000000374	-1.18	0.239
UMR	-0.000000689	0.00000433	-1.59	0.111
KRT	0.000000489	0.000000543	0.09	0.928
TPT	-0.6009039	0.1223426	-4.91	0.000
PMA	0.0007572	0.00005776	1.31	0.190
EXPr	-0.6265283	0.2985689	-2.10	0.036
MPr	1.000001	0.000000473	2.10	0.000

Based on the test results in Table 2 it shows that the intercept and slope values for each exogenous variable using the SYS-GMM approach model; if the probability value is above 5%, then it is declared to have no influence. Meanwhile, a probability value below 5% is declared influential which can be presented in table 2 (1.) The L1 Poverty variable (Lag) has a probability value of 0.199, which means that the test results have no influence on the SYS-GMM model. (2.) HDI has a probability value of 0.319 > 0.05. It can be concluded that the HDI variable does not have a positive influence on poverty. (3.) The population variable does not have a positive effect on poverty, because the probability value is 0.135 > 0.05. (4.) The number of Labor Force does not have a negative influence on poverty because the probability value is 0.239 > 0.05. (5.) UMR has a probability value of 0.111 > 0.05, it can be concluded that the UMR variable does not have a negative influence on poverty. (6.) The KRT variable does not have a positive effect on poverty because the probability value is 0.928 > 0.05. (7.) The TPT variable has a negative influence on poverty because the probability value is 0.000 < 0.05. (8.) PMA has a probability value of 0.190 > 0.05, it can be concluded that the PMA variable does not have a positive influence on poverty. (9.) Exports have a probability value of 0.036 < 0.05 and can be concluded that the Export variable has a negative influence on poverty. (10.) The import variable has a positive influence on poverty, because the probability value is 0.000 < 0.05.

Arellano-Bond Model Specification Test

Table 3 Arellano-Bond Specification Test

Models	Statistik Value	P-Value
FD-GMM	-1.1117	0.1707
SYS-GMM	-1.1052	0.2691

The dynamic panel data regression model uses the Arellano-Bond test to find and check whether the estimation results are consistent. This shows whether there is a correlation between the remaining components and other residual components. This test is carried out by comparing the second order p-value with = 5%, and if the p-value is > or 5%, then there is no autocorrelation. Based on the results of the Arellano-Bond test above, it can be explained that the second-order p-value on FD-GMM is 0.1707, which means there is no autocorrelation on FD-GMM. Meanwhile, the second order p-value of SYS-GMM is 0.2691, meaning that there is no autocorrelation in SYS-GMM.

Sargan Test

Table 4 Sargan Test

Models	Statistik Value	P-Value
FD-GMM	2.420312	1.0000
SYS-GMM	6.960213	1.0000

The dynamic panel data of regression model uses the Arellano-Bond test to find and check whether the estimation results are consistent. This shows whether there is a correlation between the remaining components and other residual components. This test is carried out by comparing the second order p-value with = 5% and if the p-value is

> 5% then there is no autocorrelation (Baltagi, 2005). Based on the results of the Arellano-Bond test above, it can be explained that the second order p-value on FD-GMM is 0.1707, which means there is no autocorrelation on FD-GMM. Meanwhile, the second order p-value of SYS-GMM is 0.2691, meaning that there is no autocorrelation of H0 is accepted in SYS-GMM models.

Unbiased Estimation Test

Table 5 Unbiased Parameter Estimation

Predictor	FEM	FD-GMM	SYS-GMM	PLS
POV L1.	0.5683	0.1671	0.3383	0.2835

Based on Table 5, it can be seen that the coefficient value of the FD-GMM model, is 0.1671, which means that the coefficient value is between the FEM model and the PLS model, because the coefficient value is smaller than the FEM model and PLS model. The SYS-GMM coefficient value is 0.3383, meaning the coefficient value is smaller than the FEM model and greater than the PLS model. So it can be said that the model that meets the Unbiasedness criteria is the SYS-GMM model,

Table 6 Fulfillment of Criteria

Criteria	FD-GMM	SYS-GMM
Sargan Test	Fulfilled	Fulfilled
Arellano-Bond Test	Fulfilled	Fulfilled
Unfamiliarity	Not fulfilled	Fulfilled

Based on Table 6, it can be seen that the best model that meets the criteria is the SYS-GMM model because all the classical assumption criteria have been met.

Regression Elasticity Coefficient

Table 7 Test Long-Term And Short-Term Parameters

Predictor	Short-Term Elasticity Coefficient	P value	Long-Term Elasticity Coefficient	P value
POV	-	-	-	-
IPM	0.1442297	0.319	-0.0219491	0.734
JP	1.694976	0.135	1.694976	0.135
JAK	-0.000000044	0.239	-0.000000855	0.319
UMR	-0.000000689	0.111	-0.000000964	0.099
KRT	-0.00000000486	0.928	-0.0000000295	0.281
TPT	-0.6009039	0.000	-0.7705214	0.000
PMA	0.0007572	0.190	0.0009167	0.069
Ekspor	-0.6265283	0.026	-0.6265285	0.036
Import	1.000001	0.000	1.000001	0.000

Based on the results of processed data that meets the criteria obtained in the SYS-GMM model estimation, there are two stages, namely short-term estimation and long-term estimation. Based on the results of the data processing above, it can be explained as follows:

The Effect of Short-Term and Long-Term Elasticity HDI on Poverty Levels

The test results in the Table 7 show that the short-term elasticity value of the human development index variable is 0.1442297, and the p-value is 0.319. In this case, the human development index does not have a significant positive effect in the short term on poverty levels. Meanwhile, the long-term elasticity is -0.0219491 and the p value is 0.73. This also does not have a significant positive effect in the long term on poverty levels. In other words, it can be interpreted that increasing the value of the Human Development Index by 1% will reduce poverty, but partially it does not have a significant effect on poverty, because the p-value in the short and long term is > significance level (α)= 5% or 0.05. This happens because the Human Development Index is still low so that development is still hampered which will have an impact on society and will be affected in certain years, meaning that there is no short-term impact elasticity but there is no long-term effect or impact on the Human Development Index in future determinations.

Effect of Population of Short-Term and Long-Term Elasticity on Poverty Levels

Population with a short-term elasticity value of 1.694976 and a p-value of 0.135. This does not have a significant positive effect on poverty levels. Meanwhile, the long-term elasticity is 1.694976 and the p-value is 0.135. This also does not have a significant positive effect on poverty levels. So it can be interpreted that the population increases by 1% every year. partially does not have a significant effect on poverty, because the short-term p-value and long-term p-value > significance level (α) = 5% or 0.05. This happens because the current population is getting higher so that the level of employment is unbalanced and will happen in the following year, meaning that there is no effect in the short term and there is no long-term effect on poverty in future determinations.

The Effect of Short-Term and Long-Term Elasticity of the Labor Force on Poverty Levels

The short-term elasticity value for the number of workers is -0.000000044 and the p-value is 0.239. This does not have a significant negative effect on poverty levels. Meanwhile, the long-term elasticity value is -0.000000855, and the p-value is 0.319. This also does not have a significant negative effect on poverty levels. So it can be concluded that the variable number of labor force increases by 1% each year. So poverty decreases; however, partially, it does not have a significant effect on poverty because the p-value in the short term and long term is > significance level (α) = 5% or 0,05. This is because the number of the workforce is increasing and the number of jobs is still decreasing, so it will not be guaranteed in the following year, meaning that there will be no short-term impact or long-term impact in efforts to eradicate poverty.

The Effect of Short-Term and Long-Term Elasticity Regional Minimum Wages on Poverty Levels

Regional Minimum Wage with a short-term elasticity value of -0.000000689 and a p-value of 0.111. This does not have a significant negative effect on poverty levels.

Meanwhile, the long-term elasticity value is -0.000000964 with a p-value of 0.099. This also has no significant negative effect. It can be concluded that every year the Regional Minimum Wage increases by 1%, it will reduce poverty, however, partially it does not have a significant impact on poverty because the p-value in the short and long term is > significance level (α) = 5% or 0,05. This happens because the Regional Minimum Wage is still not in line with the existing workforce so it cannot guarantee that household income will increase, thereby affecting people's welfare in the following year. This means that there are no short-term effects or long-term impacts on poverty.

The Effect of Short-Term and Long-Term Elasticity of Household Consumption on Poverty Levels

Household consumption's short-term elasticity value is -0.00000000486 and the p-value is 0.928. This does not have a significant positive effect on poverty levels. Then the long-term elasticity value is -0.00000000295 and the p-value is 0.281. This also has no significant positive and negative effect on the poverty level. So it can be concluded that every year household consumption increases by 1%, which will increase poverty. However, partially there is no significant effect on poverty because the p-value in short-term elasticity and long-term elasticity is > alpha significance level (α) = 5% or 0,05. This is because the level of expenditure in a group of households is still relatively high and not commensurate with the income earned, so that the level of household consumption is not in line with the level of income that will be guaranteed in the following year. This means that there is no short-term or long-term impact on the poverty level itself.

The Effect of Short-Term and Long-Term Elasticity Open Unemployment Rates on Poverty Levels

The short-run value of the open unemployment rate is -0.6009039, and the p-value is 0.000. This has a significant positive influence on poverty levels. Meanwhile, the long-term value is -0.7705214, with a p-value of 0.000. This also has a significant negative influence on poverty levels which means open unemployment increases by 1% every year so that poverty increases. Partially, it has a significant effect on poverty levels, one of which is because the short-term and long-term p values are < 1 alpha significance level (α) = 5% or 0,05. This is because the published unemployment rate continues to increase every year due to the large population and limited employment opportunities, and now the published unemployment rate is increasing. Therefore, the level of open unemployment guaranteed for next year and the following years will have a short-term and long-term impact on poverty rates.

The Effect of Short-Term and Long-Term Elasticity of Foreign Investment on Poverty Levels

Embedding Foreign Models, the short-term elasticity value is 0.0007572 and the p-value is 0.069. This does not have a significant positive effect on poverty levels. Meanwhile, the long-term elasticity value is 0.0009167 and the p-value is 0.069. This also does not have a significant positive effect on poverty levels. It can be concluded that if PMA

increases by 1% every year, poverty decreases. However, partially it has no significant effect on poverty, because the p-value in the short and long term is $>$ the alpha significance level (α) = 5% or 0,05. This happens because, in general, PMA has a significant effect on reducing poverty rates, but in the analysis of data processing, PMA has no effect on poverty levels, so it will not guarantee that in the following year it will not have an impact in the short and long term on poverty levels.

The Effect of Short-Term and Long-Term Export Elasticity on Poverty Levels

Exports produce a short-term estimated value of -0.6265283 and a p-value of 0.026. This has a significant positive influence on the poverty level. Meanwhile, the long-term estimated value is -0.6265285 and the p-value is 0.026. This also has a significant positive influence on poverty levels. So it can be concluded that exports increase by 1% each year so that the poverty level will decrease. Partially, it can have a significant effect on poverty because the p-value in the short and long term is $<$ alpha significance level (α) = 5% or 0,05. This is because export diversification is related to the export product innovation process, part of the strategy for increasing economic growth and efforts to alleviate poverty levels in a region so that at the export level it will guarantee at the next stage short-term and long-term impacts on poverty.

The Effect of Short-Term and Long-Term Import Elasticity on Poverty Levels

This research found that imports had a short-term elasticity value of 1.000001 and a p-value of 0.000. This has a significant positive influence on poverty levels. Meanwhile, the elasticity value in the long term produces the same value, namely 1.000001 and a p-value of 0.000. This also has a significant positive influence on poverty levels. This means that partially the Import variable can have a significant effect on poverty because the p-value of short-term and long-term elasticity is $<$ alpha significance level (α) = 5% or 0,05. So this happens because in import activities the rate of increase in prices is getting higher and more diverse so that people's purchasing power tends to decrease and it will be difficult to get or produce goods and services. Moreover, this will also guarantee that in the following year it will have an impact in the short and short term.

Conclusion

Based on the results of data analysis and discussion of this research, it can be concluded that open unemployment has a significant negative influence on poverty levels from 2013 to 2022. These results can provide a reference that (1) HDI does not have a significant positive influence on poverty levels from 2013 to 2022. Because the Human Development Index is still low, development is still hampered which will have an impact on society and will be affected in certain years. (2) The population does not have a significant positive influence on the poverty level from 2013 to 2022. Because the current population is getting higher, the level of employment is unbalanced and this will happen in the following year. (3) The number of the labor force does not have a significant negative influence on the poverty level from 2013 to 2022. This is because

the number of the labor force is increasing and the number of job opportunities is still decreasing. (4) The UMR does not have a significant negative influence on poverty levels from 2013 to 2022. Because the Regional Minimum Wage is still not in line with the existing workforce, it cannot guarantee that household income will increase, thereby affecting people's welfare in the following year. (5) KRT does not have a significant positive influence on poverty levels from 2013 to 2022. Because the level of expenditure in a group of households is still relatively high and not commensurate with the income earned, the level of household consumption is not in line with the level of income that will be guaranteed in the following year.

Further explanation regarding the 6th variable, PMA does not have a significant positive effect on poverty levels from 2013 to 2022. This happens because, in general, PMA has a significant effect on reducing poverty rates, but in analysis in processing PMA data, it has no effect in poverty level will not be guaranteed in the following year. (7) TPT is increasing which cannot balance the number of existing jobs. Short-term and long-term elasticity in TPT have a significant negative influence on poverty from 2013 to 2022. (8) Exports have a significant negative influence on poverty levels from 2013 to 2022. These results can provide a reference that when exports increase, poverty levels will decrease. (9.) Imports have a significant positive effect on poverty levels from 2013 to 2022. These results can provide a reference that when the value of imports increases, the poverty level will also increase. There is a clear positive relationship between short-term and long-term elasticities and poverty levels.

Based on the Generalized Method of Moment Arellano-Bond, this is done because empirically many economic variables are dynamic, meaning that the value of a variable can be influenced by other variables and influenced by the value of the variable in question in previous periods. In this study it can be found that the poverty level has been influenced by several exogenous variables such as Open Unemployment Rate, Exports And Imports. The limitation in the research is that it only has ten variables, simultaneously there are seven variables that have no effect and three variables that have an effect. This can provide suggestions for the government in Indonesia to make the latest breakthroughs in decision making to reduce poverty levels so that people's welfare will increase.

Author Contributions

Conceptualisation, Methodology, Analysis; S.S, Original draf preparation; E and JH.S, Review and editing; H.A

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Conflicts of interest

In the compilation of the manuscript of the published article there is no conflict of interest of any kind to any party. However, if the conflict is found in the future, then this becomes the responsibility of the author. The author hereby declares that the compilation of the article has been made in truth.

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