JEJ
Jambura Equilibrium Journal

Volume 7. Issue 1. January 2025
P-ISSN 2655-9110
E-ISSN 2656-0445
http://ejurnal.ung.ac.id/index.php/equij

Agricultural GDP, Agricultural Labor And Farmer Exchange Rate On Poverty In Sumatra Island: A Dynamic Panel Approach-GMM

Istikomah[1], Fahrizal Taufiqqurrachman[2]

[1,2]Development Economics, Economics, Bojonegoro University, East Java Province, Indonesia

Email: istik1220@gmail.com

Abstract: *This study aims to determine the effect of agricultural GRDP, agricultural labor, and farmer exchange rate on poverty on the island of Sumatra using a dynamic panel approach with the Generalized Method of Moments (GMM) method. The data type used is panel data covering 10 provinces on the island of Sumatra from 2017-2023. The method used is dynamic panel data regression analysis with the Generalised Method of Moments (GMM) method. The results showed that agricultural GRDP had a negative and insignificant effect on poverty, agricultural labor had a positive and significant impact on poverty and the farmer exchange rate (NTP) had a positive and insignificant impact on poverty. The government can encourage the growth of the agricultural sector by prioritizing export-oriented commodities and improving workers' ability through better skills training. In addition, assistance to farmers, especially in regulating selling prices at the farm level, diversifying agricultural products, improving the quality of agricultural products, and downstream agrarian products to encourage the agricultural sector, increasing technological intensity, and choosing the right method or cropping pattern.*

Keywords: Agricultural GDP; Agricultural Labor; Farmer Exchange Rate; Generalized Method of Moment (GMM); Poverty

Article History:

Received on 10 Oct 2024
Revised on 22 Oct 2024
Accepted on 22 Nov 2024

Doi: 10.37479

Indexing:
Google Scholar; Portal Garuda; Crossref; SINTA 3 (Science And Technology Index)

INTRODUCTION

Poverty is a crucial issue in economic development, both in developed and developing countries such as Indonesia. This problem seems to be a repetitive and unresolved cycle, so it continues to be the main concern of the government (Asmadia et al., 2024). According to Nurulita et al., (2023), poverty is a condition in which a person cannot fulfill their basic needs properly. Some of the factors that contribute to poverty include low levels of education, lack of skills that can be converted into selling points, and the lack of government's role in overcoming this problem. Poverty is a major hindrance in the government's efforts to achieve economic development goals. Economic development, which ideally aims to improve people's welfare, income, and economic growth in all sectors, employment expansion, price stability, and quality of life, is hampered by the existence of poverty (Santika & Juliansyah, 2022).

The government has made great efforts in various programs to improve people's welfare, especially in overcoming poverty. National development is a transformative process that aims to achieve progress, including poverty alleviation (Anggraini et al., 2023). The government realizes that national development that focuses on accelerating economic growth, employment, and stabilizing the prices of basic goods has great potential to reduce poverty (Didu & Fauzi, 2016). To achieve this goal, the government focuses on regional development, especially in regions with increasing poverty rates. This regional development is carried out in an integrated, structured, and sustainable manner, adjusted to the needs of each region, to achieve national development targets that have been set in the long-term and short-term plans (Purnama, 2017).

Sumatra Island, which is one of the largest islands in Indonesia, consists of 10 provinces, namely Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Bangka Belitung Islands, Riau Islands. These 10 provinces also experience poverty and inequality problems. The following is the development of poverty rates in the 10 provinces on the island of Sumatra in the last 7 years.

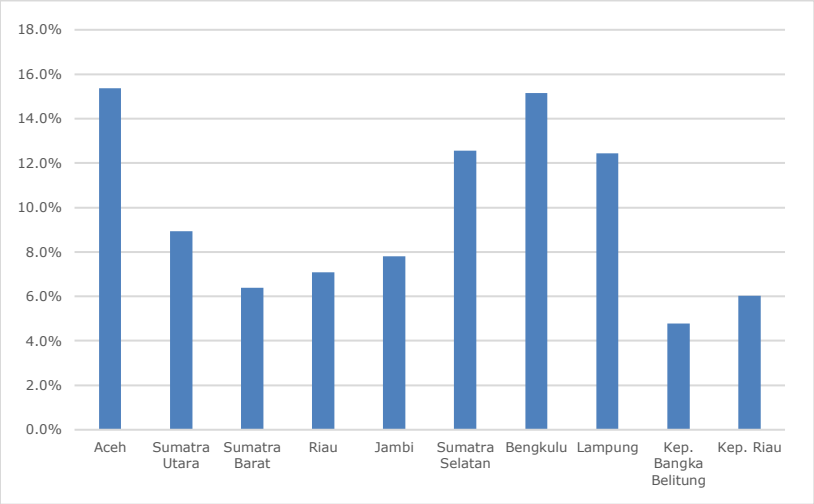

Figure 1. Average Percentage of Poor Population (P0) by Province in Sumatra Island, 2017-2023 (In Percent)
Source: Central Bureau of Statistics (Data processed in 2024)

Based on the data presented, Aceh Province recorded a higher average poverty rate than other provinces in Sumatra Island, reaching 15.4%. In contrast, the Province of Bangka Belitung Islands shows a relatively low average poverty rate of 4.8%. This difference indicates a significant economic gap between the two regions. Some of the factors that contribute to this gap include limited access to education, health, employment opportunities, and capital. Other problems include suboptimal agricultural productivity, low farmer welfare, and lack of control over the conversion of agricultural land to non-agricultural land (Mahrina et al., 2022).

According to Kuncoro (2006:209) in Agustina et al., (2018), there are three causes of poverty from an economic perspective, namely, firstly, poverty arises because of inequality in the pattern of ownership of resources which results in an unequal distribution of income. Second, poverty arises due to differences in human resources, the low quality of human resources means low productivity which in turn low wage levels. Third, poverty arises due to differences in access to capital ownership. These three causes of poverty lead to the theory of the vicious cycle of poverty.

The concept of poverty according to Malthus is the process of economic development that occurs by itself. Economic development is a process of rising and falling economic activity and is related to the development of welfare. The development of community welfare can be seen in the amount of a person's income. The application of Malthus' theory to economic development regarding poverty and underdevelopment of underdeveloped countries, namely the analysis of the causes of poverty in underdeveloped countries is closely related to the poverty of farmers due to lack of fertile land, but farmers do not have the capital to improve their land. Demand for agricultural output and the agricultural sector remains limited in size. The agricultural sector does not provide adequate employment in large numbers and has minimal wages (Jhingan M.L, 2002) in (Yustie, 2017).

The agricultural sector plays an important role in the Indonesian economy, as evidenced by its role in employing a large proportion of the population, helping to alleviate poverty, and driving economic growth (Nasrun & Indra, 2020). GRDP is the main benchmark for assessing the performance and economic activity of a region. By looking at GRDP, we can assess how successful the local government has been in encouraging economic sectors to achieve growth and community welfare (Arifah, 2021) in (Taufiqqurrachman, 2022). Gross Regional Domestic Product (GRDP), both based on current prices and constant prices, is an important indicator to understand the economic condition of a region in a certain period. GRDP is the overall added value obtained from all business units in a particular region or describes the overall value of final goods and services obtained by all aspects of the economy. Regional Domestic Product (GRDP) at the regional level (province /regency/city) symbolizes the expertise of a region to produce output at a certain time (Hasibuan et al., 2022). According to Salqaura et al., (2023), agricultural GRDP has a negative and significant effect on poverty, meaning that if the output of the agricultural sector produced by the community increases, it will have an impact on reducing poverty. And vice versa if the output of the agricultural sector decreases, it will increase poverty.

The agricultural sector contributes significantly to the Gross Regional Domestic Product (GRDP) in Sumatra, more than any other sector. This shows that the agricultural sector plays an important role in Sumatra's economy and is the main source of income for most of its population. According to BPS (2023) five provinces in Sumatra, namely North Sumatra, West Sumatra, Jambi, South Sumatra, and Riau, became the largest coffee producers in Indonesia in 2022. In addition, Riau also still holds the title as the largest palm oil-producing province in Indonesia with a plantation area of 2.87 million hectares, or 18.70 percent of the total national palm oil plantation area.

Riau's dominance in palm oil production shows the province's great potential in the plantation sector, which contributes significantly to the regional and national economy. The plantation sector in Sumatra, particularly oil palm, has contributed significantly to the region's GRDP and labor absorption.

The important role of the agricultural sector has a positive impact on improving the welfare of the community, especially farmers. This sector remains the main pillar in achieving high economic growth and income equality, compared to other sectors. Therefore, efforts to improve the productivity and competitiveness of the agricultural sector are key to realizing community welfare and promoting sustainable economic growth (Fatwa & Abrar, 2022). Although the agricultural sector plays an important role in the economy, in reality, it is considered one of the sources of poverty. This is because the majority of people who work in the agricultural sector are rural people, most of whom are poor. Nevertheless, based on the type of employment, labor absorption in the agricultural sector is the highest compared to labor in other sectors (Anakusara et al., 2019).

The agricultural sector in Sumatra can absorb 9,637,825 workers (33.55 percent) of the total labor force in Sumatra. The large number of workers in the agricultural sector is also one of the factors that have an important influence on economic growth and poverty levels (Indra, 2023). According to Umam & Furqon (2024) labor has a positive and significant effect on poverty, meaning that if the number of workers increases, poverty will increase. This is because most agricultural sector workers are less productive workers both in terms of productive age and in terms of skills. The lack of productivity of agricultural sector workers will cause a lack of maximum output produced so that it cannot significantly increase economic activity as one of the media in reducing poverty levels (Udi et al., 2023).

Labor is the population of working age between 15 and 64 years old or the total population of the region who can produce goods and services when there is a demand for labor and they want to do the job (Mulyadi S, 2017). Meanwhile, according to Sumarni & Suprihanto, (2014), labor is a person who has skills in making and producing goods and services so that he gets a wage following the results of his abilities. Agricultural labor absorption is the amount of labor absorbed into the agricultural sector at a certain time. Changes in the number of agricultural labor will have an impact on national food security in the future (Omotesho et al., 2014).

The farmer exchange rate is one of the tools that can be used to assess the welfare of farmers. The Farmer Exchange Rate (NTP) is a measure of the exchangeability of agricultural goods produced by farmers with goods or services needed for household consumption and the need to produce agricultural products. The NTP index is the ratio between the price index received by farmers (It) and the price index paid by farmers (Ib). The price index received by farmers is a price index that shows the development of producer prices for farmers' production. The index paid by farmers is a price index that shows the development of prices for farmers' household needs, both for household consumption and for the production process (BPS, 2024b). This is driven by the increase in the price index received by farmers (It) compared to the price index that must be paid by farmers (Ib). Therefore, the welfare of the agricultural workforce must be considered so that farmers can increase their productivity in producing food goods as well as energy sources and others (Annisa & Chandriyanti, 2021). The farmer exchange rate can describe the relationship between the sale of products produced and the purchase of goods and services consumed by farmers (Ramadhanu et al., 2021). The farmer exchange rate has a negative and significant effect on the poverty rate, meaning that an increase in the farmer exchange rate will reduce the poverty rate (Rahmawati, 2020). According to Suripto et al., (2020), a high NTP reflects the strong purchasing power of farmers because the selling price of agricultural products is higher than the price of necessities purchased. A high NTP will increase the real income of farmers so that it has the opportunity to alleviate poverty.

Several studies have been conducted to analyze the factors affecting poverty in the agricultural sector, which continue to be conducted to obtain empirical results. The results of research conducted by Andrean et al., (2023); Maulidina et al., (2022) show that GRDP has a significant positive effect on poverty. However, this result is different from the research conducted by Usaid & Yunani (2021); and Firmansyah & Achmad (2022) which shows that GRDP has a negative and insignificant effect on poverty. Meanwhile, the results of research conducted by Udi et al., (2023) show that the number of agricultural sector workers has a negative and insignificant effect on poverty. This research is different from research conducted by Umam & Furqon (2024) which states that the number of agricultural sector workers has a significant positive effect on poverty. Furthermore, research conducted by Rozali (2020) shows that the Farmer Exchange Rate (NTP) has a positive and significant effect on poverty. However, this result is different from the research conducted by Setiawan et al., (2020) which shows that the Farmer Exchange Rate (NTP) has a negative and insignificant effect on poverty.

Based on the research that has been done, there are gaps in previous research, this shows that there are differences in research results between various researchers, so re-analysis is needed to determine the effect of Gross Regional Domestic Product (GRDP) in the agricultural sector, agricultural labor and Farmer Exchange Rate (NTP) on poverty. This research uses dynamic panel data analysis with the Generalised Method of Moment (GMM) as a form of novelty in the research to be conducted. GMM is chosen in this study because it has the advantage of being a variable instrument method developed by Arellano & Bond (1991) with the GMM principle that can estimate parameters in dynamic panel data models to produce unbiased, consistent, and efficient estimation values. Therefore, the purpose of this study is to determine the effect of agricultural GRDP, agricultural labor, and farmer exchange rate (NTP) on poverty on the island of Sumatra using a dynamic panel approach with the Generalized Method of Moments (GMM).

METHODOLOGY

This research uses quantitative descriptive research using secondary data from the Central Bureau of Statistics. The data used is panel data, which is a combination of time series and cross-section data. The time series used is 2017-2023 and the cross section used is 10 provinces on the island of Sumatra. The sample in this study used a total sampling technique, namely all samples were equal to the total population so 70 samples were obtained. Data collection techniques in the study were documentation and literature review. Documentation by downloading data that has been published by the Central Statistics Agency (BPS) and literature review in the form of supporting theories and various other types of literature. Based on the explanation that has been presented previously, the research variables and operational definitions can be presented as follows.

Table 1. Research Variables and Operational Definitions

Variable	Operational Definition	Unit
Poverty (Y)	Percentage of poor population (P0) by province in 2017-2023	%
Gross Regional Domestic Product of Agriculture Sector (X1)	Quarterly GRDP at constant prices by business field in provinces across Indonesia in 2017-2023	Billion Rupiah
Agricultural Labour (X2)	Percentage of labor employed in the agricultural sector in the provinces of Indonesia in 2017-2023	%
Farmer Exchange Rate (X3)	The ratio between the price index received by farmers and the price index paid by farmers in 2017-2023	%

Source: Data processed (2024)

The data analysis technique used in this study uses dynamic panel data regression analysis with the Generalised Method of Moments (GMM) method with the help of STATA 16 software. Many economic variables are dynamic, meaning that the value of a variable is influenced by the value of other variables and also the value of the variable concerned in the past. Thus, a dynamic panel data model is needed. In the dynamic panel data model, there is a lag of the dependent variable which acts as an explanatory variable. This variable is correlated with the error. Thus, estimation using OLS will produce biased and inconsistent estimators. According to Anderson dan Hsiao (1982) in Shina (2016) using the instrument variable estimation method is by instrumenting variables that are correlated with errors. The weakness of this method is that it produces unbiased and consistent estimators, but it is not efficient. To overcome this problem, the GMM principle is used to estimate parameters in dynamic panel data models. According to Arellano & Bond (1991) in Prasetyo (2019) there are two reasons underlying the use of GMM. First, GMM is a common estimator and provides a more useful framework for comparison and assessment. Second, GMM provides a simple alternative to other estimators, especially maximum likelihood. In addition, GMM has the advantage that the variable instrument method with GMM principles can estimate parameters in dynamic panel data models so as to produce unbiased, consistent, and efficient estimation values. The dynamic panel data regression model equation in this study is formulated as follows:

$$\mathrm{Y_{i,t}} = \beta_0 + \delta \mathrm{Y_{i,t-1}} + \beta_1 \mathrm{X1} + \beta_2 \mathrm{X2} + \beta_3 \mathrm{X3} + \mathrm{u_{i,t}}$$

Where Y is poverty, X1 is agricultural GRDP (ln), X2 is agricultural labor (Percent), and X3 is the Farmer Exchange Rate (NTP) (Percent). β_0 is a constant, $\beta_{1\text{-}5}$ are independent coefficients, and i, t is an error term where i is a cross-section and t is a time series.

The approaches used in estimating dynamic panel data regression models are first difference GMM (FD-GMM) and system GMM (SYS-GMM). FD-GMM is used to overcome the problem of correlation between the lag of the dependent variable and the error component, so the first difference can be done. It aims to eliminate the individual effect of μi in the model. Meanwhile, SYS-GMM is used to estimate the system of equations by combining the first difference moment with the level condition moment (Arellano & Bond, 1991).

First Difference Generalised Moment Method (FD-GMM)

FD-GMM developed by Arellano & Bond (1991) aims to produce unbiased, consistent, and efficient estimates. Here is a simple dynamic panel data model without including the exogenous variables regression method that adds the dependent variable lag as an independent variable. The dynamic model equation is defined as follows:

$$\mathrm{y_{i,t}} = \delta \mathrm{y_{i,t-1}} + \beta \mathrm{x'_{i,t}} + \mathrm{u_{i,t}}$$

According to Baltagi (2021) to eliminate individual effects, the first difference is performed. With the following equation:

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

Then the variable instrument matrix for the first difference model is defined as follows:

$$Z_{diff} = \begin{bmatrix} [\Delta y_{i,2}] & 0 & \cdots & 0 \\ 0 & [\Delta y_{i,2}] & \vdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & 0 & [\Delta y_{i,T-2}] \end{bmatrix}$$

Parameter estimation with the Arellano-Bond method using the Generalised Method of Moments (GMM) principle aims to obtain consistent estimates. The GMM estimator for the parameter δ is obtained by minimizing the quadratic function.

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

So based on the condition moments and instrument matrix of the first differencing model variable above, the estimation of δ is obtained, namely:

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

δ is a consistent estimate for δ for any weight matrix W. This estimate is obtained by performing the GMM Arellano-Bond one-step consistency estimator method. The consistency of the estimate is not affected by the selection of weights, but by choosing the optimal one, it will get efficient estimation results so that according to Arellano & Bond (1991) the optimal weight W is as follows.

$$\widehat{W} = \hat{\Lambda}^{-1} = N^{-1}\sum_{i=1}^{N} Z\text{diff}\,\Delta\hat{v}_i \Delta\hat{v}'_i Z\text{diff}$$

So to obtain a consistent estimate for δ (two step efficient estimator) by distributing weights W by $\hat{\Lambda}^{-1}$, so that the Arellano-Bond GMM estimation results become as follows.

$$\hat{\delta}\text{diff} = \left[\left(N^{-1}\sum_{i=1}^{N} (\Delta y_{i,t-1} Z\text{diff})\right)\hat{\Lambda}^{-1}\left(N^{-1}\sum_{i=1}^{N} (\Delta y_{i,t-1} Z\text{diff})\right)\right]^{-1} \left[\left(N^{-1}\sum_{i=1}^{N} (\Delta y_{i,t-1} Z\text{diff})\right)\hat{\Lambda}^{-1}\left(N^{-1}\sum_{i=1}^{N} Z'_{\text{diff}} \Delta y_i\right)\right]$$

The above equation is a consistent, efficient, and unbiased Arellano-Bond GMM estimation.

System Generalised Moment Method (Sys-GMM

According to Blundell & Bond (1998), it is important to utilize initial conditions in producing efficient estimators of dynamic panel data models when they are small. The system GMM is a method used to estimate a system of equations by combining first difference moments and level moments. The GMM estimator for δ is obtained by minimizing the weighted squared function J (δ).

$$\frac{\partial J(\hat{\delta})}{\partial \hat{\delta}} = 2\left[\left(N^{-1}\sum_{i=1}^{N} \varphi'_{i,-1} Z_{sys}\right)\widehat{W}\left(N^{-1}\sum_{i=1}^{N} Z'_{sys}\varphi_i\right)\right] + 2\left[\left(N^{-1}\sum_{i=1}^{N} \varphi'_{i,-1} Z_{sys}\right)\widehat{W}\left(N^{-1}\sum_{i=1}^{N} Z'_{sys}\varphi_i\hat{\delta}\right)\right] = 0$$

Then one step consistent estimator for the system can be obtained, namely.

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

The δ estimator is consistent and does not depend on how the weights are chosen. In the one-step consistent

estimator, the choicthemBond adapted the $\hat{\delta}$ obtained in the one-step consistent estimator by replacing. $\widehat{\mathbf{W}} = \widehat{\boldsymbol{\psi}}^{-1}$ With:

$$\widehat{\boldsymbol{\psi}}^{-1} = \mathrm{N}^{-1}\sum_{\mathrm{i}=1}^{\mathrm{N}} \mathrm{Z}'_{\mathrm{sys}}\hat{\mathrm{q}}_{\mathrm{i}}\hat{\mathrm{q}}'_{\mathrm{i}}\mathrm{Z}_{\mathrm{sys}}$$

So that the resulting two-step efficient Blundell and Bond GMM System estimates are as follows:

$$Delta\hat{\delta} = \left[\left(\mathrm{N}^{-1}\sum_{\mathrm{i}=1}^{\mathrm{N}} \varphi'_{\mathrm{i},-1}\mathrm{Z}_{\mathrm{sys}}\right)\widehat{\boldsymbol{\psi}}^{-1}\left(\mathrm{N}^{-1}\sum_{\mathrm{i}=1}^{\mathrm{N}} \mathrm{Z}'_{\mathrm{sys}}\varphi_{\mathrm{i},-1}\right)\right]^{-1}\left[\left(\mathrm{N}^{-1}\sum_{\mathrm{i}=1}^{\mathrm{N}} \varphi'_{\mathrm{i},-1}\mathrm{Z}_{\mathrm{sys}}\right)\widehat{\boldsymbol{\psi}}^{-1}\left(\mathrm{N}^{-1}\sum_{\mathrm{i}=1}^{\mathrm{N}} \mathrm{Z}'_{\mathrm{sys}}\mathrm{q}_{\mathrm{i}}\right)\right]$$

The estimation results of the two-step efficient Blundell and Bond GMM System Estimator above are more efficient than the two-step efficient Arrelano and Bond Estimator.

Sargan Test

Sargan test is used to determine the validity of the use of instrument variables whose number exceeds the number of parameters estimated (overidentifying restrictions condition) (Warwo, 2002).

Sargan test hypothesis is as follows:

H_0: The condition of overidentifying restrictions in model estimation is valid
H_1: The overidentifying restrictions condition in the model estimation is invalid

Arellano-Bond Test

The Arellano-Bond test is used to see the consistency of the estimation results by using the Arellano-Bond statistics m1 and m2. This consistency is indicated by a significant statistical value of m1 and a non-significant statistical value of m2 (Baltagi, 2005).

H_0: There is no autocorrelation in 2nd order first difference errors.
H_1: There is autocorrelation in the 2nd-order first difference errors.

Unbiasedness Test

The unbiasedness criterion is obtained by comparing the GMM-dependent lag estimator with the downward-biased FEM (Fixed Effect Model) and the upward-biased PLS (Pooled Least Squares). An unbiased estimator will fall between the FEM and PLS models (Baltagi, 2005).

RESULTS

Descriptive Statistical Analysis Test

A descriptive statistical analysis test is used to analyze the data that has been collected by drawing conclusions that apply in general. The results of descriptive statistical processing consisting of the mean, median, maximum, minimum, and standard deviation of the research variables from the data collected are as follows.

Table 2. Descriptive Statistical Test Results

Variable	Obs	Mean	Std. Dev.	Min	Max
Y	70	9,653286	3,767659	4,45	16,89
X1	70	10,46806	1,017846	8,579614	11,9398
X2	70	81,93471	6,833361	66,78	91,99
X3	70	108,4461	14,49198	86,89	152,93

Source: Data processed (2024)

Based on the presentation of Table 2, the average poverty (Y) was 9.653286 percent with a variability of 3.767659 percent, the lowest value was 4.45 percent and the highest value was 16.89 percent. The average agricultural GRDP (X1) was 10.46806 percent with a variability of 1.017846, the lowest value of 8.579614 percent, and the highest value of 11.9398. The average agricultural labor force (X2) was 81.93471 percent with a variability of 6.833361, the lowest value of 66.78 percent, and the highest value of 91.99 percent. The average farmer exchange rate (X3) was 108.4461 percent with a variability of 14.49198, the lowest value was 86.89 percent and the highest value was 152.93 percent.

Estimation of Dynamic Panel Data Regression Mode

At this stage, the dynamic panel data regression model is estimated using the first-difference GMM two step estimators approach and the system GMM two step estimators. The intercept and slope values for each independent variable with the FD-GMM and SYS-GMM approaches are shown in Table 3 and Table 4.

Table 3. Parameter Estimation of FD-GMM Approach

Parameters	Coefficients	Standard Error	z	P value
Y L1.	0,1166539	0,1071453	1,09	0,276
X1	-11,885	4,015626	-2,96	0,003
X2	-0,0089379	0,0101767	-0,88	0,380
X3	-0,0053714	0,0096604	2,17	0,030
cons	0,0209294	0,0096604	2.17	0.030
Uji Walk	134,45			
P value	0,0000			

Source: Data processed (2024)

Based on the test results Table 3, shows the intercept and slope values for each exogenous variable using the FD-GMM approach, if the probability value is above 0.05, it is declared to have no effect. While the probability value is below 0.05, it is declared influential. In Table 3, the poverty variable Y L1. has a probability value of 0.276, which means that the test results do not influence the FD-GMM model. Agricultural GRDP (X1) has a probability value of 0.003. It can be concluded that the agricultural GRDP variable has a negative and significant influence on poverty. The agricultural labor variable (X2) has a probability value of 0.380. It can be concluded that the number of agricultural workers has a negative and insignificant influence on poverty. The farmer exchange rate variable (X3) has a probability value of 0.030. It can be concluded that the farmer exchange rate (NTP) has a negative and significant influence on poverty

Table 4. Parameter Estimation of SYS-GMM Approach

Parameters	Coefficients	Standard Error	z	P value
Y L1.	0,9372637	0,0676909	13,85	0,000
X1	-0,335205	0,5759638	-0,23	0,817
X2	0,0629334	0,0193443	3,25	0,001
X3	0,0044494	0,0056619	0,79	0,432
Cons	-3,794683	3,63252	-1,04	0,296
Uji Walk	2950,75			
P value	0,0000			

Source: Data processed (2024)

Based on the test results Table 4, shows the intercept and slope values for each exogenous variable using the SYS-GMM approach, if the probability value is above 0.05, it is declared to have no effect. While the probability value is below 0.05, it is declared influential. In Table 2, the poverty variable Y L1. has a probability value of 0,000, which means that the test results influence the SYS-GMM model. Agricultural GRDP (X1) has a probability value of 0.817. It can be concluded that the agricultural GRDP variable has a negative and non-significant effect on poverty. The variable number of agricultural workers (X2) has a probability value of 0.001. It can be concluded that agricultural labor has a positive and significant influence on poverty. The Farmer Exchange Rate variable (X3) has a probability value of 0.432. It can be concluded that the farmer exchange rate (NTP) has a positive and non-significant effect on poverty.

Model Specification Test

Model specification tests were conducted using the Sargan test, Aellano-Bond test, and unbiasedness as follows.

Sargan test

According to Arellano & Bond (1991), the Sargan test on model specification is used to determine the validity of the variables whose instruments are estimated (over-identifying conditions). The test is done by comparing the second order p value with = 5% and if the p value> 5% then there is no autocorrelation.

Table 5. Sargan test FD-GMM and SYS-GMM

FD-GMM	P value	SYS-GMM	P value
6,514886	0,9518	7,729894	0,9892

Source: Data processed (2024)

Based on the estimation table above, shows the statistical value of the Sargan test results on both FD-GMM and SYS-GMM models. The FD-GMM statistical value is 6.514886 and the P value> α (0,05) or 0,9518> 0,05, meaning that the FD-GMM model is valid or the variables are not correlated with errors. The SYS-GMM statistical value is 7,729894 and the P value > α (0,05) or 0,9892 > 0,05, meaning that the SYS-GMM model is valid or the variables are not correlated with errors.

Arellano-Bond Test

The Arellano-Bond test is conducted to determine the correlation between one residual component and another residual component in the dynamic panel data model. Testing is done by comparing the second order p value with = 5% and if the p value> 5% then there is no autocorrelation.

Table 6. Arellano-Bond test FD-GMM and SYS-GMM

Model	Statistical value	P value
FD-GMM	0,46898	0,6391
SYS-GMM	1,5268	0,1268

Source: Data processed (2024)

Based on estimation of the table above, it shows the value of the Arellano-Bond test statistics on the FD-GMM and SYS-GMM models. The FD-GMM statistical value at the 2nd order is 0.46898 and P value > α (0.05) or 0.6391 > 0.05, meaning that the FD-GMM model is not exposed to autocorrelation and the data is consistent, while the SYS-GMM statistical value at the 2nd order is 1.5268 and P value > α (0.05) or 0.1268 > 0.05, meaning that the SYS-GMM model is not exposed to autocorrelation and the data is consistent.

Unbiasedness Test

Table 7. Unbiasedness tes FD-GMM and SYS-GMM

Parameters	Coefficient FEM	Coefficients FD-GMM	Coefficients SYS-GMM	Coefficients PLS
Y L1.	0,38626979	0,11665391	0,93726375	0,96316643

Source: Data processed (2024)

The table shows the results of the unbiased test where the criterion is that the FD-GMM or SYS-GMM model will not be biased if its value is between FEM and PLS. The FD-GMM value is not between FEM and PLS where FEM (0.38626979) > FD-GMM (0.11665391) < PLS (0.96316643), meaning that the FD-GMM model is biased. While the SYS-GMM value is between FEM and PLS where FEM (0.38626979) < SYS-GMM (0.93726375) < PLS (0.96316643), meaning the SYS-GMM model is unbiased.

Dynamic Panel Data Model Selection

The best model is selected based on the results that meet the assumption test criteria given in Table 8.

Table 8. Dynamic Panel Data Model Selection

Criteria	FD-GMM	SYS-GMM
Sargan test	Fulfilled	Fulfilled
Arellano-Bond test	Fulfilled	Fulfilled
unbiasedness test	Not Fulfilled	Fulfilled

Source: Data processed (2024)

Based on the test results above, it is found that the best model is SYS-GMM because it fulfills all the test criteria. The SYS-GMM model is also considered to increase efficiency compared to FD-GMM which produces efficient estimators on dynamic panel data when the time series are small (Baltagi, 2008) (Hidayat et al., 2020).

Interpretation of Results

The best model selected based on the above analysis is the SYS-GMM model, then the model obtained can produce the following equation:

$$\mathrm{Y_{i,t}} = -3{,}794683 \; + \; 0{,}9372637 \; Y_{i,t-1} \; - \; 0{,}335205 \; \mathrm{X1} \; + \; 0{,}0629334 \; \mathrm{X2} \; + \; 0{,}0044494 \; \mathrm{X3} \; + \; \varepsilon \, \mathrm{i},$$

The following is the interpretation of the equation:

a. A constant value of -3.794683 indicates that if the value of agricultural GRDP (X1), agricultural labor (X2), and Farmer Exchange Rate (NTP) (X3) is equal to 0, then poverty (Y) will decrease by -3.794683%.
b. The value of Y L1. of 0.9372637 explains that if there is an increase in poverty in the previous period by 1%, it will increase poverty by 0.9372637%.
c. The coefficient value of X1 of - 0.335205 explains that if there is an increase in agricultural GRDP by 1%, it will decrease poverty by 0.335205%.
d. The X2 coefficient value of 0.0629334 explains that a 1% increase in agricultural labor will increase poverty by 0.0629334%.
e. The coefficient value of X3 of 0.0044494 explains that if there is an increase in the farmer exchange rate (NTP) by 1%, poverty will increase by 0.0044494%.

DISCUSSION

The Effect of Agricultural GRDP on Poverty

The results of the analysis show that agricultural GRDP has a negative and insignificant effect on poverty. This illustrates that an increase in agricultural GRDP cannot affect the decline in poverty. The results of this study can be attributed to Chenery's theory, which is the same as the Lewis model. Chenery's theory, known as the pattern of development theory on the transformation of production structure, shows that in line with the increase in per capita income, a country's economy will shift from relying on the agricultural sector to the industrial sector as the engine of economic growth (Suwarni, 2006). This is because the agricultural sector often faces challenges such as weather uncertainty, undeveloped technology, and limited economies of scale. Therefore, a large contribution of the agricultural sector to GRDP may reflect an underdeveloped economy and potentially hinder the acceleration of higher economic growth.

The results of this study are in line with research conducted by S. et al., (2023) in Gorontalo Province which states that the agricultural sector GRDP has a negative and insignificant effect on poverty. This is because changes in the value of agricultural sector production are not strongly associated with changes in poverty levels in a region. This result follows the opinion of Latumaresa (2015:208) in S. et al., (2023) that a decrease in agricultural sector GRDP does not always mean that it will directly have a significant negative impact on poverty in a region. Many other factors that influence the relationship between agricultural economic growth and poverty levels need to be taken into account. The agricultural sector is often affected by natural factors such as erratic weather, natural disasters, and climate change. These uncertainties can cause fluctuations in agricultural production from year to year. As a result, although the agricultural sector's GRDP shows a decline in some years, this does not reflect a consistent and sustainable situation that can directly affect poverty.

The National Policy Direction in the RPJMN 2020-2024 in increasing agricultural GRDP is focused on increasing production and productivity by mechanizing agriculture to produce low-cost or more efficient farming. Agricultural mechanization activities need to be carried out from upstream, on-farm, and downstream industries to increase the effectiveness and efficiency of agricultural businesses. The downstream agricultural industry is focused on processing derivatives of main commodities such as livestock, palm oil, coconut, rubber, wood, rattan, sago, cocoa, coffee, medicinal plants, fruits, floriculture and spices, development of geographical indications of herbal/medicinal plants, and standardization of national herbal medicine processes and products (Kementerian Pertanian Republik Indonesia, 2021).

Effect of Agricultural Labor on Poverty

The analysis shows that agricultural labor has a positive and significant effect on poverty. This illustrates that an increase in agricultural labor can affect the increase in poverty. This research can be attributed to Lewis' theory, that the agricultural sector in the area has reached a point where the addition of labor no longer results in a significant increase in output. This means that each additional worker in the agricultural sector will decrease overall productivity. As a result, despite reducing the number of workers in the agricultural sector, output will not decrease significantly. This condition causes labor wages in the agricultural sector to be very low, reflecting the low value-added produced by each worker (Ginantie, 2016).

The results of this study are in line with research conducted by Umam & Furqon (2024) in Indonesia which states that agricultural labor has a significant positive effect on poverty. A less qualified workforce due to low education will affect the criteria for workers needed by the company so many people who do not meet the criteria end up becoming unemployed. This is in line with research by Nasrun & Indra (2020) which states that low labor productivity causes the role of the agricultural sector to be less reliable in reducing the number of poor people so that it cannot increase the wages of labor in the sector and alleviate its workers from poverty. Therefore, the more labor in the agricultural sector, the more poor people there are because the marginal product of labor is getting smaller.

The agricultural sector is generally the livelihood of the majority of poor laborers. According to the RPJMN 2020-2024, low income is closely related to low productivity, lack of ownership of productive assets, and limited access to financing institutions. Through poverty alleviation policies, the government continues to create productive jobs, improve social assistance policies, and seek funding for community initiatives that are proven to have a socio-economic impact. One of the efforts to improve human quality is through assistance in various agricultural development programs, such as through increasing the role of agricultural extension officers, agricultural consultants, and field facilitators (Kementerian Pertanian Republik Indonesia, 2021).

Effect of Agricultural Exchange Rate on Poverty

The analysis shows that the farmer exchange rate (NTP) has a positive and non-significant effect on poverty. This illustrates that an increase in the farmer exchange rate cannot affect the increase in poverty. The results of this study are different from the Malthus theory in development economics. This theory argues that the process of economic development occurs by itself. Economic development is a process of rising and falling economic activity and is related to the development of welfare. The welfare of a country depends partly on the amount of output produced by labor, and partly on the value of that product. The application of Malthus' theory to economic development regarding poverty and underdevelopment of underdeveloped countries is that the analysis of the causes of poverty in underdeveloped countries is closely related to the poverty of farmers due to lack of fertile land, but farmers do not have the capital to improve their land. Demand for agricultural output and the agricultural sector remains limited in size. The agricultural sector does not provide adequate employment in large numbers and has minimal wages (Jhingan M.L, 2002) in (Yustie, 2017).

The results of this study are in line with research conducted by Yacoub & Mutiaradina (2020) in Indonesia. This is because although NTP has increased, poverty will also increase due to several factors such as inadequate human resources so that farmers are not familiar with rapid technology. Some farmers own land but the land is not so extensive that it can affect NTP. However, the results of this study are not in line with the general principle that the higher the NTP, the lower the poverty rate. Many factors make the relationship between NTP and poverty complex. According to Palengkabu et al., 2019 in Jannah & Yuniarti (2024), concluded that farmers who rely solely on agriculture as their main source of income are often unable to fulfill their daily needs. Farmers often spend hours in the fields every day, but it takes months to get a harvest.

Based on Undang-Undang Republik Indonesia Nomor 19 Tahun 2013 Tentang Perlindungan Dan Pemberdayaan Petani, the form of policy that can be provided to protect the interests of farmers, namely the facilitation of agricultural insurance to protect farmers from crop failure losses due to natural disasters and/or other types of risks. In addition to Farmer Protection policies, Empowerment efforts also play an important role in achieving Farmer welfare. Several activities are expected to stimulate farmers to be more empowered, including consolidation and guarantee of agricultural land area, provision of financing and capital facilities, easy access to science, technology, and information, and strengthening Farmer Institutions. In addition, based on the RPJMN 2020-2024, one of the Major Projects is the strengthening of business guarantees and 350 farmer and fishermen corporations. The essence of the development of farmer corporations is carried out through strengthening the economic institutions of legal farmers who can create agricultural business units independently or in partnership with other business entities to increase productivity, added value, and competitiveness to realize farmers' welfare (Kementerian Pertanian Republik Indonesia, 2021).

CONCLUSION

Based on the analysis, it can be concluded that an increase in agricultural GRDP does not have a significant effect on poverty reduction in Sumatra Island. This is because an increase in GRDP does not increase farmers' income, the agricultural sector has low productivity, and poverty is related to other factors such as access to education, health, and infrastructure. In addition, agricultural sector labor has a positive and significant effect on poverty, because the more labor in the agricultural sector, the more poor people there are because the marginal labor product is getting smaller. The farmer exchange rate also has no significant effect on poverty, because even though the NTP has increased, poverty will also increase due to several factors such as poor human resources and small land area.

This study has several shortcomings. Firstly, there is a lack of exploration of other factors that also affect poverty. Secondly, this study focuses more on the agricultural sector without considering interactions with other sectors that also contribute to poverty alleviation. Thirdly, the data used has limitations in terms of time and place coverage, so the results cannot be generalized to all regions of Indonesia. Future research is expected to focus on in-depth analyses of other factors that influence poverty. Future research can use other variables that include economic, social, and environmental aspects. In addition, future research can use more comprehensive data and cover a longer period and more diverse regions.

The benefit of the results of this study for policymakers is to provide deeper insight into the factors that influence poverty in the agricultural sector so that they can formulate more targeted policies. Thus, the government can encourage the growth of the agricultural sector by prioritizing export-oriented commodities and improving the ability of workers through better skills training. In addition, assistance to farmers, especially in terms of regulating selling prices at the farm level, diversifying agricultural products, improving the quality of agricultural products, and downstream agricultural products to encourage the agricultural sector, increasing technological intensity, and choosing the right method or cropping pattern. One of them is to apply polyculture cropping patterns, either using intercropping systems, intercropping, intercropping or others. Apart from being more efficient, this cropping pattern can help obtain diverse crop yields that are more profitable. Thus, the government can help increase farmers' income and reduce poverty on the island of Sumatra.

REFERENCES

Agustina, E., Syechalad, M. N., & Hamzah, A. (2018). Pengaruh jumlah penduduk, tingkat pengangguran dan tingkat pendidikan terhadap kemiskinan di Provinsi Aceh. *Jurnal Perspektif Ekonomi Darussalam (Darussalam Journal of Economic Perspec, 4(2), 265-283.*, *4*(2), 265–283.

Anakusara, R., Jamal, A., Seftarita, C., & Maipita, I. (2019). Economic Growth and Employment in Agricultural Sector on Poverty In Aceh Province. *Trikonomika*, *18*(1), 1–7.

Andrean, P., Marliyah, M., & Batubara, M. (2023). Determination of Poverty through Unemployment in North Sumatra. *Indonesian Interdisciplinary Journal of Sharia Economics (IIJSE)*, *6*(2), 1289–1318.

Anggraini, D., Sudharyati, N., Putra, R. A., Ramdhan, N., Putra, M. I. N., & Putra, H. H. (2023). Pengaruh Pertumbuhan Ekonomi , Indeks Pembangunan Manusia (IPM), dan Kemiskinan terhadap Tingkat Pengangguran Terbuka di Provinsi Jambi Selama Tahun 2017-2021. *Ekonomis: Journal of Economics and Business*, *7*(1), 672–676. https://doi.org/10.33087/ekonomis.v7i1.1082

Annisa, K., & Chandriyanti, I. (2021). Analisis Faktor-Faktor Yang Mempengaruhi Nilai Tukar Petani Di Provinsi Kalimantan Selatan Tahun 2009-2018. *JIEP: Jurnal Ilmu Ekonomi Dan Pembangunan*, *4*(2), 443–452.

Arellano, M., & Bond, S. (1991). Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *The Review of Economic Studies*, *58*(2), 277–297. https://doi.org/https://doi.org/10.2307/2297968.

Asmadia, T., Andriany, V., & Sani, M. S. (2024). Pengaruh Tingkat Pengangguran , Pertumbuhan Ekonomi , dan Inflasi Terhadap Tingkat Kemiskinan pada Provinsi Regional Sumatera. *Jurnal Akuntansi, Manajemen Dan Ilmu Ekonomi (JASMIEN)*, *04*(3), 115–124.

Baltagi, B. H. (2005). *Econometric Analysis of Panel Data*. New York: John Wiley dan Sons, Ltd.

Baltagi, B. H. (2021). *Econometric Analysis of Panel Data*. Berlin: Springer.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, *87*(1), 115–143. https://doi.org/https://doi.org/https://doi.org/10.1016/S0304-4076(98)00009-8

BPS. (2023). *Statistik Kelapa Sawit Indonesia 2022*. Badan Pusat Statistik. https://www.bps.go.id/id/publication/2023/11/30/160f211bfc4f91e1b77974e1/statistik-kelapa-sawit-indonesia-2022.html

BPS. (2023). *Statistik Kopi Indonesia 2022*. Badan Pusat Statistik. https://www.bps.go.id/id/publication/2023/11/30/abde293e6c0fc5d45aaa9fe8/statistik-kopi-indonesia-2022.html

BPS. (2024). *[Seri 2010] PDRB Triwulanan Atas Dasar Harga Konstan Menurut Lapangan Usaha di Provinsi Seluruh Indonesia (Miliar Rupiah), 2010-2024*. Badan Pusat Statistik. https://www.bps.go.id/id/statistics-table/1/MjIwNiMx/-seri-2010--pdrb-triwulanan-atas-dasar-harga-konstan-menurut-lapangan-usaha-di-provinsi-seluruh-indonesia--miliar-rupiah---2010-2024.html

BPS. (2024). *NTP (Nilai Tukar Petani) menurut Provinsi (2018=100), 2023*. Badan Pusat Statistik. https://www.bps.go.id/id/statistics-table/2/MTc0MSMy/nilai-tukar-petani--april-2024.html

BPS. (2024). *Persentase Penduduk Miskin (P0) Menurut Provinsi dan Daerah (Persen), 2024*. Badan Pusat Statistik. https://www.bps.go.id/id/statistics-table/2/MTkyIzI=/persentase-penduduk-miskin--p0--menurut-provinsi-dan-daerah.html

BPS. (2024). *Persentase Tenaga Kerja Informal Sektor Pertanian (Persen), 2021-2023*. Badan Pusat Statistik. https://www.bps.go.id/id/statistics-table/2/MTE3MSMy/persentase-tenaga-kerja-informal-sektor-pertanian.html

Didu, S., & Fauzi, F. (2016). Pengaruh Jumlah Penduduk, Pendidikan Dan Pertumbuhan Ekonomi Terhadap Kemiskinan Di Kabupaten Lebak. *Jurnal Ekonomi-Qu*, *6*(1), 102–117.

Fatwa, R., & Abrar, M. (2022). The Effect of the Agriculture Sector on Poverty in Aceh Province. *The Effect of the Agriculture Sector on Poverty in Aceh Province. International Journal of Quantitative Research and Modeling*, *3*(2), 77–86.

Firmansyah, U., & Achmad, E. (2022). PDRB sektor pertanian terhadap ketimpangan distribusi pendapatan provinsi-provinsi di Pulau Sumatera. *E-Jurnal Perspektif Ekonomi Dan Pembangunan Daerah*, *11*(1), 9–14.

Ginantie, B. (2016). Analisis Dampak Pertumbuhan Sektor Pertanian Terhadap Kemiskinan Jawa Timur. *Jurnal Ilmiah Mahasiswa FEB*, *5*(1).

Hasibuan, R. R., A., Kartika, A., Suwito, F. A., & Agustin, L. (2022). Pengaruh Produk Domestik Regional Bruto (PDRB) terhadap Tingkat Kemiskinan Kota Medan. *Reslaj: Religion Education Social Laa Roiba Journal*, *4*(3), 683–693. https://doi.org/10.47476/reslaj.v4i3.887

Hidayat, M., Darwin, R., & Hadi, M. F. (2020). Does energy infrastructure reduce inequality inter-regional in Riau Province, Indonesia ? Does Energy Infrastructure Reduce Inequality Inter-regional in Riau Province, Indonesia ? *International Journal of Energy Economics and Policy*, *10*(1), 160–164. https://doi.org/10.32479/ijeep.8658.This

Indra, I. (2023). Pengaruh Tenaga Kerja Sektor Pertanian Dan Pdrb Sektor Pertanian Terhadap Pertumbuhan Ekonomi Dan Kemiskinan Di Indonesia. *Jurnal Ekonomi Integra*, *13*(1), 116–125.

Jannah, H. N., & Yuniarti, D. (2024). Pengentasan Kemiskinan melalui Pertumbuhan Sektor Pertanian : Studi Kasus 10 Provinsi dengan Tingkat Kemiskinan Tertinggi di Indonesia (2014-2023). *In Seminar Nasional Potensi Dan Kemandirian Daerah*, *2*, 197–207.

Kementerian Pertanian Republik Indonesia. (2021). *Keputusan Menteri Pertanian Republik Indonesia Nomor 484/Kpts/Rc.020/M/8/2021 Tentang Perubahan Kedua Atas Keputusan Menteri Pertanian Nomor 259/Kpts/Rc.020/M/05/2020 Tentang Rencana Strategis Kementerian Pertanian Tahun 2020-2024.* https://bpmsph.ditjenpkh.pertanian.go.id/wp-content/uploads/2023/10/RENSTRA-KEMENTAN-2020-2024-REVISI-2-26-Agt-2021.pdf

Mahrina, M., Saharudddin, S., Juliansyah, H., & Anwar, K. (2022). Pengaruh Indeks Implisit PDRB Sektor Pertanian Dan Industri Pengolahan Terhadap Kemiskinan Di Kota Lhokseumawe. *Jurnal Aplikasi Ilmu Ekonomi*, *1*(2), 75–84.

Maulidina, S., Zahara, V. M., & Sutjipto, H. (2022). Analisis Faktor yang Mempengaruhi Kemiskinan Pada Sektor Pertanian di Indonesia Bagian Barat. *National Conference on Applied Business, Education, & Technology (NCABET)*, *2*(1), 257–269.

Nasrun, M. A., & Indra, S. (2020). The Role of Agricultural Sector in Explaining Poverty in Indonesia : A Study Case of West Kalimantan. *International Journal of Economics and Financial Issues*, *10*(5), 297–303. https://doi.org/https://doi.org/10.32479/ijefi.10334

Nurulita, F., Kamaruddin, K., & Asmini, A. (2023). Analisis Determinan Tingkat Kemiskinan Di Kabupaten Sumbawa. *Jurnal Ekonomi & Bisnis*, *11*(2), 261–272.

Omotesho, K. F., Muhammad-Lawal, A., & Ismaila, D. E. (2014). Assessment of hired labour use and food security among rural farming households in Kwara State, Nigeria. *Journal of Agricultural Sciences, Belgrade*, *59*(3), 353–361. https://doi.org/https://doi.org/10.2298/JAS1403353O

Prasetyo, G. A. (2019). The Effect Of Telecommunication Infrastructure Development On Economic Growth In Asean. *JIET (Jurnal Ilmu Ekonomi Terapan)*, *4*(1), 47–58. https://doi.org/10.20473/jiet.v4i1.13941

Purnama, N. I. (2017). Analisis pengaruh pertumbuhan ekonomi terhadap tingkat kemiskinan di Sumatera Utara. *Jurnal Ekonomikawan*, *17*(1), 163054.

Rahmawati, N. (2020). Pengaruh Kesejahteran Petani Terhadap Kemiskinan Di Perdesaan. *Jurnal Ilmu Ekonomi Dan Pembangunan*, *20*(1), 38–44.

Ramadhanu, R., Ginting, R., & Ayu, S. F. (2021). Analysis of factors affecting farmer exchange rate in North Sumatera Province. *In IOP Conference Series: Earth and Environmental Science*, *782*(2), 022050. https://doi.org/10.1088/1755-1315/782/2/022050

Republik Indonesia. (2013). *Undang-Undang Repubik Indonesia Nomor 19 Tahun 2013 Tentang Perlindungan dan Pemberdayaan Petani*. https://peraturan.bpk.go.id/Download/28249/UU Nomor 19 Tahun 2013.pdf

Rozali, M. (2020). Faktor Faktor yang Mempengaruhi Ketimpangan Distribusi Pendapatan dan Implikasinya terhadap Kemiskinan di Propinsi Sumatera Selatan. *Jurnal Ekonomi*, *22*(1), 1–16.

S., M. R. A., Halid, A., & Bempah, I. (2023). Pengaruh PDRB Sektor Pertanian , Daya Saing Umkm Pangan , Pengangguran Terhadap Penurunan Angka Kemiskinan di Provinsi Gorontalo. *SEIKO : Journal of Management & Business*, *6*(2), 326–336.

Salqaura, S. S., Nurcahyani, M., & Salqaura, S. A. (2023). The Influence of the Agricultural Sector to the Poverty in North Sumatera Province (Panel Data Analysis). *International Journal of Research and Review*, *10*(9), 129–137.

Santika, R., & Juliansyah, H. (2022). Pengaruh Pertumbuhan Ekonomi Dan Upah Buruh Terhap Tingkat Kemiskinan Di Pulau Sumatera. *Jurnal Ekonomi Regional Unimal*, *5*(2), 43–51.

Setiawan, A. H., Yusuf, E., Gunanto, A., & Hayati, B. (2020). Analysis of Poverty and Inequality in Java, Bali, and Lampung. *Economics Development Analysis Journal*, *9*(13), 55–64.

Shina, A. F. I. (2016). Penerapan 2 SLS GMM-AB pada Persamaan Simultan Data Panel Dinamis untuk Pemodelan

Pertumbuhan Ekonomi Indonesia sebagai Islamic Country. *Muqtasid: Jurnal Ekonomi Dan Perbankan Syariah*, *7*(1), 141–162.

Sumarni, M., & Suprihanto, J. (2014). *Pengantar Bisnis: Dasar-dasar Ekonomi Perusahaan (Ed.6)*. Yogyakarta: Liberty.

Suripto, Firmansayah, & X Sugiyono, F. (2020). Poverty viewed from the perspective of domestic production in Yogyakarta: the Solow growth model approach. *International Journal of Business and Globalisation*, *24*(2), 174–184. https://doi.org/10.1504/IJBG.2020.105166

Suwarni, E. (2006). Perubahan Struktur Ekonomi Indonesi. *Jurnal Ekonomi Pembangunan*, *4*(1), 19–29.

Taufiqqurrachman, F. (2022). Multiplier Effect in East Jawa (Input-Output Analysis Approach). *JEJAK: Journal of Economics and Policy*, *15*(2), 255–272.

Udi, K., Restiatun, & Rosyadi. (2023). Pengaruh Pertumbuhan Sektor Pertanian, Jumlah Pekerja Sektor Pertanian Dan Nilai Tukar Petani Terhadap Tingkat Kemiskinan Perdesaan Di Indonesia. *Jurnal Ekonomi Pembangunan*, *12*(1), 42–53.

Umam, K., & Furqon, I. K. (2024). Pengaruh Pendidikan, Tenaga Kerja, Dan Ketimpangan Distribusi Pendapatan Terhadap Kemiskinan Di Indonesia Pada Tahun 2021. *Jurnal Penelitian Mahasiswa Ilmu Sosial Ekonomi Dan Bisnis Islam (SOSEBI)*, *04*(1), 46–59.

Usaid, P. Y., & Yunani, A. (2021). Belanja Daerah Program Sektor Pertanian dan Dana Desa terhadap Angka Kemiskinan melalui PDRB Sektor Pertanian. *Keizai*, *2*(2), 101–110.

Warwo, G. (2002). Estimasi Model Data Panel Dinamis dalam Ilmu Politik. *Analisis Politik*, *10*(1), 25–48. https://doi.org/10.1093/pan/10.1.25

Yacoub, Y., & Mutiaradina, H. (2020). Analisis Kesejahteraan petani dan Kemiskinan Perdesaan di Indonesia, Pontianak: *Prosiding Seminar Akademik Tahunan Ilmu Ekonomi Dan Studi Pembangunan (SATIESP 2020).*

Yustie, R. (2017). Analisis Pengaruh Indeks Pembangunan Manusia (IPM) dan Tingkat Pengangguran Terbuka (TPT) Terhadap Kemiskinan Kabupaten dan Kota di Provinsi Jawa Timur. *Equilibrium: Jurnal Ekonomi-Manajemen-Akuntansi*, 49–57.