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The Influence of Economic Factors on Economic Growth in the Province of Sumatera Island

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Abstract

Economic Growth reflects the ability of a country or region to improve the standard of living of its citizens through increased output of goods and services. Based on existing theories and several studies that have been conducted, economic growth, especially in the province of Sumatera Island, is generally related to several factors such as plantations, investment, and inflation. This study aims to test and analyze the effect of plantations, investment, and inflation on economic growth in the province of Sumatera Island in 2014-2023. The type of research used in this research is descriptive quantitative while the data source used in this research is secondary data from the Central Statistics Agency (BPS). The object of this research is the province on the island of Sumatera. This study uses panel data with a cross section of 10 Sumatera island provinces and a 10-year time series, starting from 2014 to 2023. The analysis method used is panel data regression. The results of this study indicate that the best model is the Fixed Effect. Based on the regression results, it is known that partially the independent plantation variable and the investment variable have a positive and significant effect on economic growth. While the inflation variable has a positive and insignificant effect on economic growth. Similarly, the independent variables of plantations, investment, and inflation have a significant influence on economic growth in the province of Sumatera Island with a Prob (F-static) value of $0.00000 < 0.05$.

Keywords: Plantation; Investment; Inflation; and Economic Growth

1. Introduction

Indonesia's economy has performed quite well amidst global uncertainty. In recent years, Indonesia has experienced significant economic growth, despite facing various global challenges, such as economic uncertainty, commodity price fluctuations, and the impact of the Covid-19 pandemic. According to data from the Central Bureau of Statistics (BPS), Indonesia's economic growth in 2022 reached 5.31%, showing a strong recovery after the negative impact caused by the pandemic [1]

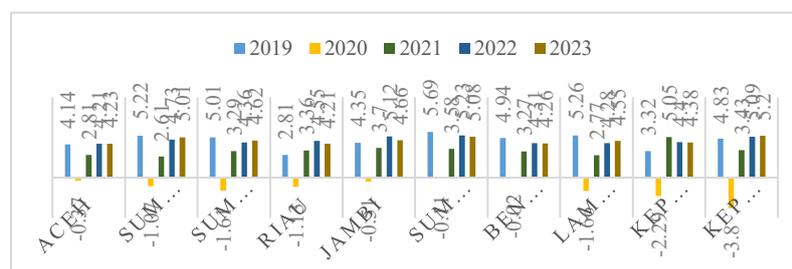


Figure 1.1 Growth Rate of GRDP by Province in Sumatera Island (Percent) 2019-2023 Source: Statistic Indonesia

Economic growth is defined as an increase in the production capacity of a country or region over time, which is usually measured through Gross Domestic Product (GDP) growth. Economic growth reflects a country's ability to improve the standard of living of its citizens through increased output of goods and services [2]. Economic growth without economic equality will widen

the gap between one group of people and another, while economic equality without economic growth is the same as increasing poverty in a region[3].



Figure 1.2 GDP contribution by agricultural subsector to Indonesia's GDP (Percent) 2021-2023
Source: Statistic Indonesia

With this significant contribution, the plantation subsector tops the sector. This shows that the plantation subsector plays a major role in Indonesia's economic growth[4]. Overall, only Riau recorded a significant increase, but others, such as Jambi, Lampung, and Riau Islands showed a consistent decline in production. The main challenges in this sector include fluctuating commodity prices in the global market and the impact of climate change, which has led to productivity declines of up to 10% in some regions[5].

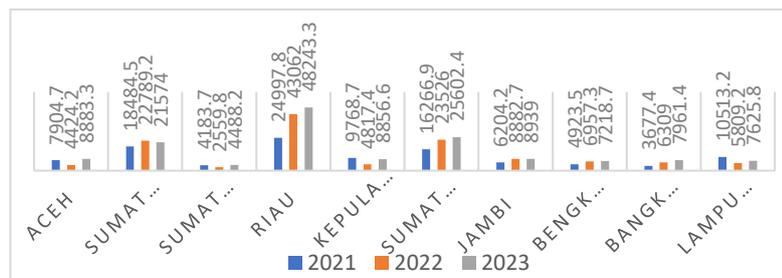


Figure 1.3 Realization of Domestic Investment in Sumatra Island Provinces (billion rupiah) 2021-2023
Source: Statistic Indonesia

Overall, the data reflects that despite investment growth in some provinces, challenges in attracting investment in certain regions remain. This suggests the need for further efforts to increase investment attraction in provinces where stagnation can contribute to the regional economy. According to [6] Harrod and Domar give investment a key role in the process of economic growth. It first creates income as a demand effect, and enlarges the production capacity of the economy by increasing the capital stock as a supply effect. Therefore, as long as investment continues, real income and output will always grow. However, to maintain the equilibrium level of income at full employment from year to year, both real income and output must increase at the same rate as the productive capacity of capital increases.

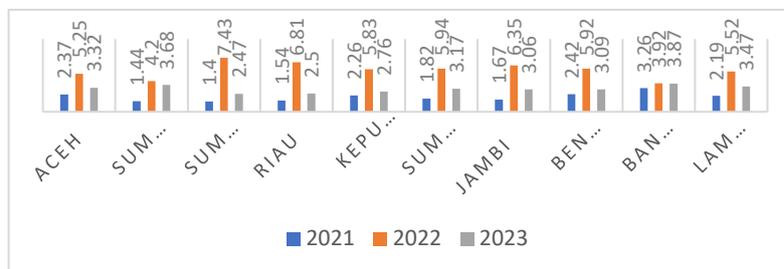


Figure 1.4 Annual Inflation Rate in Sumatera Island Province (Percent) 2021-2023
Source: Statistic Indonesia

High inflation can reduce people's purchasing power and affect economic stability. Inflation can occur due to an increase in demand that exceeds production capabilities, which often occurs in developing countries [7]. According to [8], inflation can occur due to an increase in demand that exceeds production capabilities, which often occurs in developing countries. Inflation is positively correlated with economic growth as evidenced by the short-term AD and AS curves. However, there is a negative correlation in the long run.

2. Literature Review

2.1 Economic Growth

Economic growth is an important indicator that shows the progress of a region or country. According to [9], economic growth can be measured through an increase in Gross Domestic Product (GDP) or Gross Regional Domestic Product (GRDP) within a certain period of time. In the context of Sumatra, sustainable GRDP growth reflects the region's ability to increase the production of goods and services, which has a direct impact on people's welfare. Therefore, it is important to analyze the factors that influence economic growth in this region.

2.2 Classical growth theory

Classical growth theory, pioneered by economists such as Adam Smith and David Ricardo, emphasizes the importance of capital accumulation, division of labor, and use of natural resources in promoting economic growth. In this view, capital accumulation is considered the main driver, where investment in physical capital such as machinery and infrastructure can increase production capacity and efficiency [10]. The division of labor, described by Smith, allows workers to become more skilled in specific tasks, thus increasing overall productivity. In addition, the theory also recognizes the role of natural resources and labor in the production process, with David Ricardo highlighting how the cost of resource use affects the value of goods. While this theory provides important insights into the dynamics of economic growth, criticisms have been raised regarding the assumption that growth will continue indefinitely and the lack of attention to institutional factors and innovation, which are becoming increasingly relevant in the context of modern economies.

2.3 Keynesian Economic Theory

Keynesian Economic Theory as explained by economist John Maynard Keynes, has important implications for understanding inflation dynamics and its impact on modern economies. The theory emerged in response to the economic crisis of the 1930s, dubbed the Great Depression. It offers new insights into how governments can manage the economy to achieve macroeconomic stability [11]. The main focus of Keynesian theory is inflation, which is generally understood as a common measure of economic activity and fluctuations in the price level of goods and services. Keynes observed that market mechanisms may not always be able to create a balance between demand and supply in the economy, especially in situations of excess supply and deflation. Therefore, Keynesian theory supports government efforts to increase the level of economic activity to achieve certain goals, including inflation control.

2.4 Harrod - Dommar Growth Theory

The Harrod-Domar theory of economic growth was developed by Roy F. Harrod and Evsey Domar. [12] This theory combines the classical view that emphasizes the supply side with the Keynesian approach that focuses more on the demand side. According to Harrod-Domar, the conditions that must be met in order for an economy to achieve steady growth in the long run are the need for investment. According to this theory, investment plays an important role in economic growth because it has two main functions, namely increasing production capacity and creating demand in the economy. In addition to investment, other factors that influence growth are savings and income. This is because to create investment it is necessary to increase savings.

3. Research Method

The type of research used in this study is quantitative research, where the research uses an objective research approach including data collection and data analysis using statistical tests. The scope of this research is to analyze the role of the plantation sector, investment, and inflation, on Gross Regional Domestic Product (GRDP) in all provinces of Sumatra Island in the period 2014-2023. This research refers to the dependent variable, namely the Gross Regional Domestic Product (GRDP) in the Province of Sumatra Island and the non-bound or independent variables, namely plantations, investment, and inflation in the Province of Sumatra Island. This study uses panel data with cross section data in the form of 10 provinces on the island of Sumatra and time

series data for 10 years from 2014-2023, with the number of observations for this study covering 100 observations. The multiple linear simple equation model formed is as follows:

Hypothesis Model :

The relationship between the variables in this study can be formulated in a multiple linear regression model:

$$Peit = \alpha + \beta_1 PB_{it} + \beta_2 IN_{it} - \beta_3 IF_{it} + e_{it}$$

Peit : GRDP (Gross Regional Domestic Product)

PB : Plantation

IN : Investment

IF : Inflation

α : Constant

$\beta_1 - \beta_3$: The coefficient of the independent variable which shows how much influence each independent variable has on the dependent variable

e : Error term (the influence of other factors not included in the model)

i : Cross section

t : Time series

According to [13] This study uses quantitative research methods using panel data. The econometric model used in this study is a multiple linear regression model, which is a model that has more than one independent variable. Multiple linear regression models are regression models that have more than one independent variable. The data used in this study is panel data. According to Gujarati and Porter (2015) panel data has space and time dimensions, namely the same individual unit is surveyed over time. In panel data regression models, there are 3 (three) approaches that are often used, namely:

1. Common Effect Model (CEM)

This approach is also known as pooled least square (PLS). This model simply uses all time series and cross section data. This model assumes that the intercept and slope of each variable are the same for all observations. Compared to the other two models, this model is the simplest. The estimation method used in this model is Least Squares Dummy Variables (LSDV) (Gujarati, 2009; Sihombing, 2021)

2. Fixed Effect Model (FEM)

This approach takes into account the possibility that researchers face the problem of omitted-variables, which may bring changes to the intercept time series or cross section. To overcome this, it is necessary to include dummy variables to allow for different values, both cross section and time series. The use of dummies makes this model estimator known as the least square dummy variable (LSDV) (Gujarati, 2009; Sihombing, 2021)

3. Random Effect Model (REM)

This approach improves the efficiency of the least square process by taking into account errors from cross section and time series. This REM approach is a variation of the generalized least square (GLS) estimation (Gujarati, 2009; Sihombing, 2021). To determine the approach/model to be used in the study, a test is first carried out to determine which model is best for the study.

There are several tests that must be carried out, namely the Chow Test, Hausman Test, and Lagrange multiplier test. The last stage of data analysis is hypothesis testing. Hypothesis testing is carried out to see the relationship and/or influence between the independent variable and the dependent variable. Hypothesis testing aims to prove the truth of the previously formulated research hypothesis and also aims to avoid researcher subjectivity in interpreting research results.

There are three types of hypothesis tests carried out in this study, namely:

a. Partial Significance Test (t-Statistic Test)

The t test is used to see the significance value of the effect of the independent variable individually on the dependent variable by holding other variables constant. In multiple linear regression, this needs to be done because each independent variable has a different effect in the model. This test is done by comparing t count with t table with the following conditions:

- 1) if the t value is greater than the t table then H_0 is rejected or H_a is accepted, it can be said that variable X has a significant effect on variable Y.
- 2) if the t value is smaller than the t table then H_0 is accepted or H_a is rejected, it can be said that variable X does not have a significant effect on variable Y.

b. Test (F-test)

Simultaneous The F test is used to see the effect of the independent variables as a whole on the dependent variable. This test is done by comparing the calculated F value with the F table. This test is conducted to see whether the independent variables as a whole have a significant effect on the dependent variable. If the simultaneous test results are significant, it can be said that the relationship that occurs can apply to the population.

The decision to reject or accept H_0 is as follows:

- 1) if the value of f count is greater than f table then H_0 is rejected or H_a is accepted
- 2) if the value of f count is smaller than f table then H_0 is accepted or H_a is rejected

c. Test Coefficient of Determination (R^2)

The coefficient of determination is denoted by R^2 and is generally expressed in percentage. The coefficient of determination is the value used to measure the contribution of the independent variable to the variation (increase / decrease) of the dependent variable. In other words, the dependent variable can be explained by the independent variable as much as R^2 and the rest is explained by other variables. Other Y variations (the rest) are caused by other factors that also affect y and are included in confounding errors. The criteria for testing the coefficient of determination are:

- 1) If R^2 is close to 1, then the influence of the independent variable on the dependent variable is large.
- 2) If R^2 is close to 0, then the influence of the percentage of the independent variable on the dependent variable is large.

4. Results and Discussion

Panel Data Regression Model Selection

Panel data regression is performed with three models, namely common effect, fixed effect, and random effect. Each model has advantages and disadvantages. Model selection depends on the assumptions used by researchers and the fulfillment of statistical data management requirements. Choosing a model from the three available is the first step that must be done. The following are the results of the model selection test;

The results of the chow test are as follows: determine which regression model is chosen between fixed effect or common effect in this study, the Chow Test is required. Chow Test. The following are the results of the Chow Test:

Table 4.1 Result of Chow Test

Effect Test	Statistic	d.f	Prob.
Cross-section	699.218134	(9,87)	0.0000
Cross-section Chi Square	429.500949	9	0.0000

Source: Data Processing Result, 2025

Based on the results of the chow test show that the cross section probability value is $0.0000 < 0.05$, so H_0 is rejected. Therefore, the selected model is the fixed effect model. Furthermore, it is necessary to conduct a hausman test to test the best model of fixed effect or random effect.

Table 4.2 Result of Hausmant Test

Test Summary	Chi-Sq Statistic	Chi-Sq.d.f	Prob.
Cross Section Random	18.687474	3	0.0003

Source: Data Processing Result, 2025

Based on the results of the Hausman test above, it can be seen from the cross-section random probability value of $0.0003 < 0.05$ so that H_0 is rejected and H_1 is accepted so that the selected model is the Fixed Effect Model (FEM).

Table 4.3 Panel Data Regression Results

Variabel	Koefisien	Std. Error	t-Statistik	Prob.
C	10.5964628577	0.366664	28.89967	0.0000
X1	0.1243541526	0.049831	2.495525	0.0145
X2	0.0625883898	0.007402	8.455623	0.0000
X3	0.0036230965	0.011995	0.302053	0.7633

Source: Data Processing Result, 2025

Based on the panel data regression result. then the form of the estimation model obtained is as follows:

$$Y = 10.5964628577 + 0.1243541526 * X1 + 0.0625883898 * X2 + 0.0036230965 * X3$$

The explanation is as follows:

- a. The coefficient value of 10.5964628577 means that without the variable Plantation (X1), Investment (X2), and Inflation (X3), the GRDP variable (Y) will increase by 10.5964628577 billion rupiah.
- b. The beta coefficient value of the Plantation variable (X1) is 0.1243541526, if the value of other variables is constant and the plantation variable (X1) has increased by 1%, then economic growth will increase by 0.1243541526. Vice versa, if the value of other variables is constant and the plantation variable (X1) decreases by 1%, the GRDP variable (Y) will decrease by 0.1243541526.
- c. The beta coefficient value of the Investment variable (X2) is 0.0625883898, if the value of other variables is constant and the investment variable (X2) has increased by 1%, then economic growth (Y) will increase by 0.0625883898. Vice versa, if the value of other variables is constant and the investment variable (X2) decreases by 1%, then economic growth will decrease by 0.0625883898.
- d. The beta coefficient value of the Inflation variable (X3) is 0.0036230965, if the value of other variables is constant and the Inflation variable (X3) has increased by 1%, then economic growth (Y) will increase by 0.0036230965. Vice versa, if the value of other variables is constant and the Inflation variable (X3) decreases by 1%, then economic growth (Y) will increase by 0.0036230965.

Table 4.4 Results of the t-test

Variabel	Koefisien	Std. Error	t-Statistik	Prob.
C	10.5964628577	0.366664	28.89967	0.0000
X1	0.1243541526	0.049831	2.495525	0.0145
X2	0.0625883898	0.007402	8.455623	0.0000
X3	0.0036230965	0.011995	0.302053	0.7633

Source: Data Processing Result, 2025

From table 4 above, it can be explained that the effect of the independent variable on the dependent variable partially is as follows:

1. The effect of the plantation sector (X1) on economic growth (Y). The t test results on the plantation variable have a probability value of 0.0145 < 0.05. This means that the plantation variable has a significant effect on economic growth (Y).
2. The effect of investment (X2) on economic growth (Y). The t test results on the investment variable have a probability value of 0.0000 < 0.05. This means that the investment variable (X2) has a significant effect on economic growth (Y).
3. The effect of inflation (X3) on economic growth (Y). The t test results on the Inflation variable have a probability value of 0.7633 > 0.05. Therefore, the inflation variable (X3) has no significant effect on economic growth (Y).

Table 4.5 Results of the F-test

F-statistic	866.2481	Durbin- Waston Stat	0.770316
Prob (F-Statistic)	0.000000		

Source: Data Processing Result, 2025

Based on the results of the evIEWS output above, the probability value of 0.000000 is smaller than the significance level of 0.05, so H0 is rejected and H1 is accepted. This shows that the plantation, investment and inflation variables together (simultaneously) have a significant effect on economic growth, so that the regression model can be used to predict the dependent variable.

Table 4.6 Coefficient of Determination Results

R-Squared	0.991700	Mean dependent var	12.04142
Adjusted R-Squared	0.990555	S.D. dependent var	0.789762

Source: Data Processing Result, 2025

Based on the table above, the Adjusted R-Square is 0.9917. This shows that the percentage contribution of the influence of the independent variable on the dependent variable is 99.17%. It means that the independent variables used in the model are able to explain 99.17% of the dependent variable. The remaining 0.83% is influenced by other factors outside the regression model.

The Effect of the Plantation Sector on Economic Growth

The results of the influence of the independent variable of the plantation sector (X1) have a positive and significant effect. This explains that the plantation sector (X1) is partially able to influence the level of economic growth in Sumatra Island Province. This finding is in accordance with the hypothesis put forward at the beginning of the study. According to classical growth theory, pioneered by economists namely Adam Smith and David Ricardo, emphasizes the importance of capital accumulation, division of labor, and the use of natural resources in increasing economic growth. The theory also recognizes the role of natural resources and labor in the production process, David Ricardo highlighted how the cost of using resources affects the value of goods. This theory also explains when output increases, natural resources can be utilized effectively and efficiently accompanied by an increase in the quality of human resources, this will lead to productivity and build the economy in the region. One of the key elements that influence regional economic development is regional economic growth [14]. Such as research conducted on the Effect of Oil Palm Farmers' Income on Farmers' Welfare in Waeputeh Village, Topoyo District, Central Mamuju Regency[15].

Thus, it can be concluded that the plantation sector has a positive and significant influence on economic growth. Therefore, special attention needs to be given to increasing the productivity of the plantation sector, so that economic growth can continue to increase. This increase in productivity can be achieved through various strategies, such as improving agricultural technology, training for farmers, and developing infrastructure that supports the accessibility and distribution of agricultural products.

The Effect of Investment on Economic Growth

The results of the influence of the independent variable Investment (X2) have a positive and significant effect on economic growth in the Province of Sumatra Island. This is in accordance with the hypothesis put forward at the beginning of the study. This is in accordance with the investment theory according to Harrod-Domar, which says that the conditions that must be met in order for an economy to achieve steady growth in the long term are the need for investment. In other words, the higher the investment made, the greater the potential economic growth that can be achieved. Investment plays an important role in increasing production capacity, creating jobs, and encouraging innovation and technology. This is also in line with the results of previous research by M. adzin Sadidd, Hailuddin, Baiq Satripta Wijimulawiani (2024) entitled "Analysis of the Effect of Foreign Investment (PMA), Domestic Investment (PMDN), Capital Expenditure, and Labor on Gross Regional Domestic Product in Regency / City of NTB Province in 2018-2022". The results of this study indicate that domestic investment has a positive effect on GRDP[16].

It is recommended that local and central governments improve political stability and regulatory certainty, develop supportive infrastructure, encourage education and training to improve the quality of human resources, and increase public awareness of the importance of productive investment (Indonesian Institute of Sciences, 2021).

The Effect of Inflation on Economic Growth

The results of the influence of the independent variable Inflation (X3) have a positive but insignificant effect on economic growth in Sumatra Island Province. Keynesian theory recognizes that an increase in aggregate demand can drive economic growth, especially in situations where the economy is below full capacity. This is also supported by the results of research by Yulia Dwi Kartika, Johni Paul, and Karolus Pasaribu (2021) entitled "The effect of investment and inflation on economic growth in North Sumatra province for the period 1990-2020"[17]. The results of this study explain that the inflation variable has a positive effect on the economic growth variable. Data from the Central Bureau of Statistics (2022), shows that moderate inflation can encourage public consumption, which in turn increases aggregate demand and encourages economic growth. However, the regression analysis conducted in this study shows that although inflation has a positive influence, its impact on economic growth is not strong enough to produce meaningful changes in the province's gross regional domestic product (GRDP).

From the analysis conducted, it can be concluded that inflation in Sumatra Island Province has a positive influence on economic growth, but its contribution is not significant. Factors such as price uncertainty, the uneven impact of inflation on various sectors, and external influences are the main obstacles in maximizing the impact of inflation on economic growth.

Simultaneous Effect of Plantation, Investment and Inflation on Economic Growth in Sumatera Island

Simultaneously, the three variables have a positive and significant effect on Economic Growth. Investment increases production capacity and creates jobs, while high inflation can reduce the attractiveness of investment. The plantation sector, as part of the economy, can contribute to growth through exports and the creation of added value, but it can also be affected by inflation fluctuations that affect production costs and farmers' income. Classical growth theory emphasizes the importance of investment and efficiency in resource use to achieve sustainable growth.

Overall, the interaction between these three variables of plantations, investment, and inflation suggests that policies that support investment in the plantation sector, while keeping inflation within reasonable limits, can create a conducive environment for sustainable economic growth. Further research is needed to understand these dynamics in greater depth and to formulate effective policies. With this, the hypothesis put forward at the beginning of this study is accepted.

Other factors that have a positive and significant influence on Economic Growth in Sumatra Island Province

Economic growth is the result of the interaction of various factors that influence each other, and in the context of Sumatra Island Province, there are a number of variables that contribute significantly to this growth. Based on the research of Darwin Damanik and Irsyad Lubis (2022) entitled “Analysis of the Effect of Democracy, Population, and Human Development Index on Economic Growth in Sumatra Island in 2010-2021”, the Human Development Index variable has a positive and significant effect on economic growth in Sumatra Island [18]. In Neng Murialti's research (2020) entitled “Analysis of Economic Growth in Sumatra Island with Panel Data Regression for 2015-2019” the results showed that government spending, imports and population had a positive and significant effect on Economic Growth on the island of Sumatra[19].

In a study conducted by Sri Mardian, Bernadette Robiani, Didik Susetyo (2019) entitled “Government Capital Expenditure and Working Capital Credit on Provincial Economic Growth on the Island of Sumatra” obtained the results that Government capital expenditure has a positive effect on the economic growth of the Province on the island of Sumatra, these results indicate that the increase in government capital expenditure will increase Gross Regional Domestic Product (GRDP) so as to increase economic growth and working capital credit also has a positive effect on the economic growth of the Province on the island of Sumatra[20]. These results indicate that an increase in working capital credit can increase economic growth. Therefore, there are other factors that have a significant influence besides the variables carried out by researchers, namely plantations, investment, and inflation.

Thus, other factors such as the Human Development Index, government spending, and working capital credit have a significant influence on economic growth in Sumatra Island Province. This research confirms the importance of a comprehensive approach in formulating economic policy, which not only focuses on the main variables such as investment, inflation, and the plantation sector, but also considers other factors that can support sustainable economic growth.

5. Conclusions

Based on the results of research on The Influence of Economic Factors on Economic Growth in the Province of Sumatra Island, it can be concluded that partially the plantation variable has a positive and significant effect on economic growth. Partially, the investment variable has a positive and significant effect on economic growth. Partially the inflation variable also has a positive but insignificant effect on economic growth. Based on the simultaneous test (F test) with a probability value of $0.000000 < 0.05$. it can be concluded that together the plantation, investment, and inflation variables have a significant effect on economic growth. This indicates that the three variables collectively play a role in economic growth.

Suggestions

1. For the Government
 - a. The government needs to encourage policies that are more supportive of the plantation sector, such as providing incentives to farmers, easy access to capital, and improving infrastructure and market access.
 - b. To increase investment, it is necessary to improve the investment climate through more transparent regulations, simpler bureaucratic procedures, and providing incentives for investors, especially in strategic sectors that contribute to economic growth.
 - c. More effective inflation control must be carried out through appropriate monetary and fiscal policies, such as price stability of basic needs and increasing people's purchasing power through socio-economic programs.
 - d. The government needs to integrate policies in various sectors so that their impact on economic growth is more optimal and sustainable.
2. For Business Actors and the Community
 - a. Business actors in the plantation sector are advised to be more adaptive to agricultural technology innovations in order to increase business productivity and efficiency.
 - b. The community needs to improve financial and investment literacy in order to take advantage of profitable investment opportunities and support economic growth.
 - c. Wise consumption and preference for local products can help maintain economic stability and reduce the negative impact of inflation.

3. For Future Researchers

- a. Further research is recommended to consider other factors that can affect inflation per year.

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