

DYNAMICS OF ECONOMIC GROWTH IN AGRICULTURE SECTOR AND FARMER'S TERM OF TRADE IN INDONESIA

Eddy Junaidi¹, Miftakhul Jannah²

¹Badan Pusat Statistik

email: eddy.junaidi@bps.go.id

²Badan Pusat Statistik

email: miftakh.jannah@bps.go.id

ABSTRACT

The agricultural sector is a sector that supports the economy in Indonesia has been proven to be able to survive the Indonesian crisis in 1997-1998 and during the COVID-19 pandemic crisis. This is evidenced by the large contribution of the Agricultural, Forestry, and Fisheries Industry to the national economy. Improving farmers' welfare needs to be prioritized after seeing the agricultural sector which continues to grow positively during the COVID-19 pandemic. However, in the second quarter of 2020 there was a decline in the exchange rate of farmers. Thus, a study is needed to analyze the exchange rate of farmers from year to year which can describe the movement of farmer welfare from 2011-2020. The results show the pattern of Economic Growth in the agricultural sector and Farmer's Term of Trade s fluctuate, where if we look more deeply it shows a leading pattern for Economic Growth against FTT which shows that Agriculture Growth can It is used to predict Farmer's Term of Trade, meanwhile Farmer's Term of Trade cannot predict Agriculture Growth. Besides, it is observed that each sub-sector is proven to have their respective characteristics with a fluctuating pattern where the relationships formed generally have a unidirectional relationship wherein the Food Crops, Horticulture Crops and Animal Husbandry subsectors the relationships formed indicate that Economic Growth can be used to predict FTT. Meanwhile, in the Estate Crops and Fishery subsector, the relationship that is formed shows that FTT can be used to predict Economic Growth.

Keywords: Agriculture, Economic growth, Farmer's term of trade, Subsectors

1. INTRODUCTION

The agricultural sector is a sector that also supports the economy in Indonesia. This condition can be seen from the majority of Indonesia's population who still depend on the agricultural sector so that it needs to be supported by sustainable development. The role of the agricultural sector in economic development rests on supporting Economic Growth and providing national employment opportunities; providers of food needs for the community or residents of a country; foreign exchange earner; driving the growth of the industrial sector; and poverty alleviation and welfare of rural communities (Syafa'at, Mardianto, & Simatupang, 2003). Agricultural development has a significant direct or indirect impact on the success of national development. This is shown in the creation of conditions for the implementation of development and synergistic relationships with other sectors so that the orientation of agricultural development is towards improving the welfare of development actors, namely the farmers themselves (Riyadh, 2015).

Various policies have been set by the government to improve the increase in agricultural production, such as the provision of production infrastructure, the provision of assistance and subsidies for production facilities, the provision of counseling and guidance in farming, and the application of basic price policies for certain agricultural commodities. An important aspect of the sustainability of agricultural production is the level of welfare of the agricultural business actors themselves. However, agricultural development has so far been more dominant in the production aspect, while farmers are still experiencing difficulties in improving the socio-economic situation of agricultural households, where there has been an increase in agricultural production but it has not increased farmers' income and welfare (Nurasa & Rachmat, 2013).

The orientation of agricultural development towards improving farmer welfare becomes very relevant if a study is carried out related to the impact of development carried out on improving farmer welfare so that it can be used as the basis for further agricultural development policies (Nirmala, Hanani, & Muhaimin, 2016). In this case, one of the measurements that can be used is the Farmer's Term of Trade (FTT) as an indicator that can capture the selling power and purchasing power of agriculture towards production yields as well as production costs and consumption of agricultural households. FTT is related to the purchasing power of farmers in terms of financing their household needs so that if the farmer's income is greater than the increase in the price of agricultural production, it will have an impact on their purchasing power, which shows that farmers' income has increased for the better (Keumala & Zainuddin, 2018).

The achievement of the success of agricultural development has been followed by a structural change in the national economic sector where the role of the agricultural sector has declined to be replaced by a shift in the industrial sector so which implies a heavy burden from the agricultural sector. This condition is related to the widening gap between the agricultural sector and other non-agricultural sectors as well as the decline in agricultural exchange rates due to the decline in the exchange rate of these agricultural commodities. Various phenomena of change/fluctuation, both natural, such as fluctuation in agricultural production and volatility due to market distortions such as the implementation of policies in both the agricultural and non-agricultural sectors will affect agricultural commodity prices which will have a direct impact on the Farmer's Term of Trade (Syekh, 2013).

The agricultural sector in the national economy is a sector has been proven to be able to survive the Indonesian crisis in 1997-1998 and during the COVID-19 pandemic crisis. This is evidenced by the large contribution of the Agricultural, Forestry, and Fisheries Industry to the national economy. The contribution of the Agriculture, Forestry and Fisheries Industry was in the second place of 14.68 percent in the third quarter of 2020 after the Manufacturing Industry. In addition to its considerable contribution, agriculture is one of the three sectors that consistently experienced positive growth during the COVID-19 period, namely 3.12 percent in the first quarter of 2020, 2.19 percent in the second quarter of 2020, and 2,15 percent in the third quarter of 2020.

However, an increase in crop production and farmer income does not necessarily improve farmer welfare. This can be caused if the purchasing power of the rice farmers has not increased. The level of farmer welfare is an indicator of the development of the agricultural sector. One of the measuring tools that can be used to see the welfare of farmers is the Farmer's Term of Trade (FTT). The higher the FTT value, the more prosperous the life level of the farmer. The FTT calculation is obtained from the comparison of the price index received by farmers to the price index that must be paid by farmers. FTT describes the level of exchange power/purchasing power of farmers against products purchased/paid by farmers which includes consumption and production inputs purchased. The higher the FTT value, the better the purchasing power of farmers for consumer products and production inputs, and it means that they are relatively more prosperous. An illustration to see the level of welfare of farmers is shown by the Farmer's Term of Trade (FTT) in percentage, which is the ratio between the price index received by farmers and the price index paid by farmers. A number above 100 means that the farmer experiences a surplus or the farmer's income increases more than his expenditure. This is because the production price rises more than the consumer price. To see the welfare of farmers during the Covid-19 pandemic, the amount of FTT of farmers in Indonesia in 2020 is presented in Figure 1.

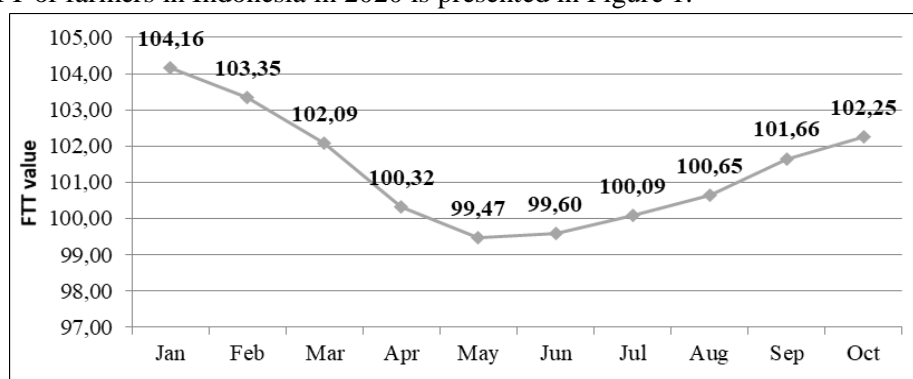


Figure 1. Farmer's Term of Trade in 2020

Source: BPS data, processed

Based on figure 1 above, the Farmer's Term of Trade from January to October 2020 has fluctuated. The lowest point of Farmer's Term of Trade in 2020 occurred in May and June 2020, with a value of 99.47 in May and 99.6 in June. The FTT value in that month is below the value of 100, which means the farmer is in deficit. The fluctuation of the Farmer's Term of Trade shows that there is still fluctuation in the ability to pay or the level of real income of farmers.

According to Professor of the Agricultural Institute, Hermanto Siregar, improving farmers' welfare needs to be prioritized after seeing the agricultural sector which continues to grow positively during the COVID-19 pandemic. (Media Indonesia, 2020). An increase in economic growth in the agricultural sector in the second and third quarters of 2020 should improve the welfare of farmers. However, in the second quarter of 2020, there was a decline in the exchange rate of farmers. Thus, a study is needed to analyze the exchange rate of farmers from year to year which can describe the movement of farmer welfare from 2011-2020.

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Based on the description related to the turmoil of agricultural development on the Farmer's Term of Trade, it also affects. In this case, agricultural development is expected to increase the purchasing power and exchange power of farmers so that this study will discuss the volatility of agricultural Economic Growth as a representation of agricultural development with the conditions of agricultural product exchange rates through the Farmer's Term of Trade indicator in each agricultural sub-sector.

Following the conditions described the Economic Growth of the agricultural sector with Farmer's Term of Trade, then the problem formulation is determined to support the resolution in this study, as follows: (1) What is the dynamic condition of the agricultural sector Economic Growth in general and sub-sectors in particular?; (2) What is the dynamic condition of Farmer's Term of Trade in general and its sub-sector in particular?; (3) How is the relationship between the Economic Growth of the agricultural sector and the Farmer's Term of Trade?.

2. RESEARCH METHOD

This study uses secondary data sourced from the Badan Pusat Statistik. The data used is quarterly data for the period from the 1st quarter of 2011 to the 3rd quarter of 2020 for data on Gross Domestic Product at constant prices (GDP constant) and Farmer's Term of Trade (FTT) in Indonesia. The GDP data collected is GDP data according to business fields for the agricultural sector and its sub-sectors, namely Food Crops, Horticulture Crops, Estate Crops, Animal Husbandry and Fishery which are used to calculate Economic Growth in the agricultural sector. Furthermore, the FTT data that is collected is routine data published monthly either in combination or based on the sub-sectors, namely the sub-sector of Food Crops, Horticulture Crops, Smallholders Estate Crops, Animal Husbandry, and Fishery. The aggregation of monthly FTT data is carried out with the arithmetic average for the quarterly period on the Price Received Index and the Price Paid Index by Farmers.

The variable operational definition are as follows:

- (1) Economic Growth is calculated from constant GDP, wherein the BPS concept is indicated by a GDP growth rate indicator which describes the growth in the production of goods and services in an economic region within a certain time interval. In this study, Economic Growth is measured from the GDP of the agricultural sector and its sub-sectors, so that it represents the growth in the production of goods and services in Indonesia in the quarterly period for the agricultural sector. The formula for the GDP growth rate (YoY) is:

$$Growth_{Q1_t} = \frac{GDP_{Q1_t} - GDP_{Q1_{t-1}}}{GDP_{Q1_{t-1}}} \times 100\% \quad (1)$$

(2) The approach to measuring the indicator of the purchasing power of farmers in rural areas is the Farmer’s Term of Trade (FTT). FTT is the ratio between the Price Received Index by farmers (I_t) and the Price Paid Index by Farmers (I_b). It is an indicator of the income level of farmer producers, while I_b is in terms of farmers' needs for both consumption and production costs. The calculation of FTT is based on the idea that as an economic agent that produces agricultural products and then the results are sold, farmers are also consumers who buy goods and services for their daily needs and also spend production costs in their efforts to produce agricultural products (BPS, 2019). The formula for calculating FTT is:

$$FTT = \frac{I_t}{I_b} \times 100 \quad (2)$$

With the I_t and I_b index calculated from the Modified Laspeyres Index formula, is:

$$I_t = \frac{\sum_{i=1}^m \frac{P_{ti}}{P_{(t-1)i}} P_{(t-1)i} Q_{0i}}{\sum_{i=1}^m P_{0i} Q_{0i}} \times 100 \quad (3)$$

The analysis used in this research is the descriptive analysis by looking at the data movement pattern of Economic Growth in the agricultural sector and combined FTT and their respective sub-sectors. Also, the Pearson correlation test was carried out to see how big the Relationship between Economic Growth and FTT and the Granger Causality test to see a two-way relationship between Economic Growth and FTT.

Pearson correlation produces a correlation coefficient which serves to measure the strength of the linear relationship between two variables. If the relationship between the two variables is not linear, the Pearson correlation coefficient does not reflect the strength of the relationship between the two variables being studied, even though the two variables have a strong relationship.

Table 1. Pearson Classification

Coefficient Interval	Level of Correlation
0.00 - 0.199	Very Low
0.20 - 0.399	Low
0.40 - 0.599	Strong Enough
0.60 - 0.799	Strong
0.80 - 1.000	Very Strong

Hypothesis: $H_0: \rho = 0$ (There is no relationship between the two variables)

$H_1: \rho \neq 0$ (There is a relationship between two variables)

Test Statistics: $t_0 = \frac{r\sqrt{n-2}}{1-r^2} \sim t_{(n-2)}$

Decision: Reject H_0 if the $|t_0| > t_{\frac{\alpha}{2};(n-2)}$

Granger Causality Test is carried out to see the causal relationship between Economic Growth and Farmer’s Term of Trade, so that it can be seen that the two variables have a mutual relationship (two-way relationship), have a unidirectional relationship, or have no relationship at all (Aulia & Ayu, 2016). In Purnomo (2001), two linear time series data equations relating to variables X and Y are as follows:

$$X_t = \sum_{i=1}^m a_i X_{t-i} + \sum_{j=1}^n b_j Y_{t-j} + u_i \quad \text{and} \quad Y_t = \sum_{i=1}^r c_i Y_{t-i} + \sum_{j=1}^s d_j X_{t-j} + v_i \quad (4)$$

where u_i and v_i are the error terms which are assumed not to contain serial correlation and. Next, calculate the sum of squared residuals values obtained from each of the above equations to obtain F-Statistics. If the test results show significance, it can reject the null hypothesis which states that variable X does not affect Variable Y. The same procedure can be used to test other null hypotheses (variable Y does not affect variable X).

3. RESULTS AND DISCUSSION

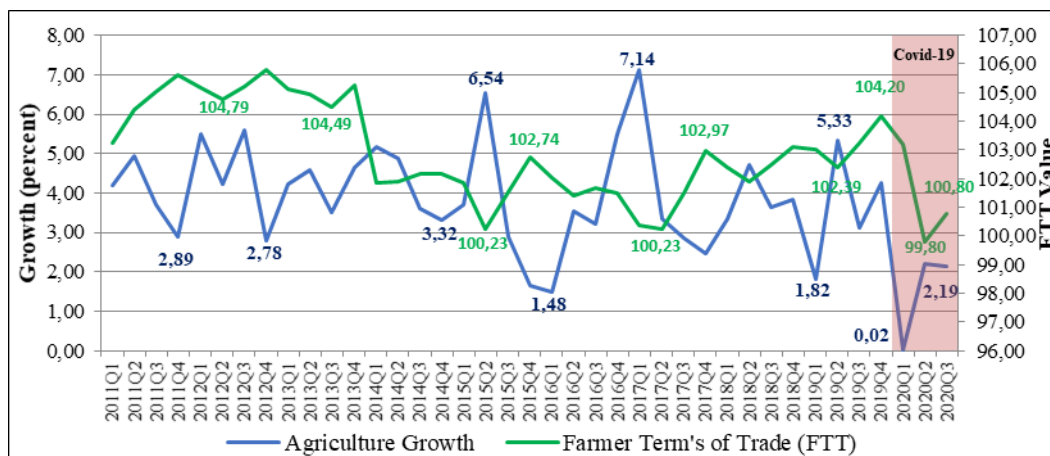


Figure 2. Economic Growth in the Agriculture sector and the Farmer's Term of Trade (FTT)
Source: BPS data, processed

Based on figure 2, it can be seen that the pattern of Economic Growth in the agricultural sector fluctuates, the highest growth occurred in the 1st quartile period of 2017, namely 7.14 percent, while the lowest growth occurred in the 1st quartile period of 2020, which was 0, 02 percent. The slowing growth in the first quartile period of 2020 is the initial period in which the Covid-19 pandemic occurred. This condition was dominated by the contraction in the growth of the Food Crops subsector as a result of a shift in the peak of the rainy season so that the harvest period shifted and extreme weather in several production center areas. Slowing growth also indicates that the agricultural sub-sector was also affected by this pandemic. Then, seen from the condition of the Farmer's Term of Trade also shows a fluctuating value, wherein general FTT is worth more than 100 which indicates that farmers experience an increase in terms of trade when the average level of prices received increases faster than the average price paid level, but in the 2nd quartile period of 2020 the FTT is worth less than 100, which is 99.80. On a deeper look, the FTT pattern has also decreased, which indicates that the Covid-19 pandemic conditions also affected exchange rate movements.

The pattern shown between Economic Growth in the agricultural sector and FTT shows a leading pattern for Economic Growth against FTT. This can be seen in the pattern of Economic Growth which is the initial indicator to determine the decline or increase in FTT, for example in the 4th quartile period 2011 experienced slowing growth while the decline in FTT only occurred in the 2nd quartile period of 2012. This condition was also supported by the Granger Causality test, as in table 1 below.

Table 2. Pairwise Granger Causality Test of Agriculture Growth and FTT

Null Hypothesis:	Obs	F-Statistic	Prob.
FTT does not Granger Cause Agriculture Growth	33	0.64196	0.6958
Agriculture Growth does not Granger Cause FTT		4.90764	0.0031**

***) significant at 0.05 level.

Source: Processed Data

The results of the Granger Causality test show that there is a direct relationship between Economic Growth in the agricultural sector and FTT. Based on the probability value of the Chi-square value, it is known that Agriculture Growth is a granger cause for FTT and FTT is not a granger cause for Agriculture Growth. This means that Agriculture Growth can be used to predict Farmer' Terms of Trades, while Farmer' Terms of Trades cannot predict Agriculture Growth. This condition explains that agricultural Economic Growth is leading, which can predict FTT in general.

The coverage of the subsector in the agricultural sector is certainly interesting to discuss in more depth because each sub-sector also has special characteristics. The subsectors covered in this research are the sub-sectors of food crops, horticulture, plantation crops, Animal Husbandry, and fisheries.

In the Food Crops sub-sector, the development of Economic Growth in the food crop sub-sector and FTT in the food crop sub-sector has fluctuated where there is also a contraction in Economic Growth in the 1st quartile period of 2020 and a decline in FTT that starts in the 1st to 2nd quartile period of 2020. The contraction occurs due to a shift in the peak of the rainy season so that the harvest and planting periods shift, extreme weather in early 2020 which resulted in the flooding of rice fields in several rice centers, and a reduction in the area of rice and other crops.

In the Horticulture Crops sub-sector, the development of Economic Growth in the Horticulture Crops sub-sector and the FTT of the Horticulture Crops sub-sector has fluctuated where there is a slowdown in Economic Growth in the 1st quartile period of 2020 and a sharp drop in FTT below 100 starting in the 1st to 2nd quartile period of 2020. Growth in The Horticulture Crops sub-sector was caused by an increase in domestic and export demand for fruit commodities.

In the Estate Crops sub-sector, the development of the Estate Crops subsector and the Smallholder Estate Crops sub-sector FTT experienced fluctuations where there was a slowdown in Economic Growth in the first quartile period of 2020 and a decrease in FTT in the second quartile period of 2020. Growth in the Smallholder Estate Crops sub-sector was due to increased exports of estate commodities such as rubber, cocoa, coffee, and oil palm.

In the Animal Husbandry sub-sector, the development of Economic Growth in the Animal Husbandry sub-sector and the FTT of the Animal Husbandry sub-sector has fluctuated where there is a contraction of Economic Growth in the first quartile period of 2020 and a decrease that also occurs in FTT for the second quartile period of 2020. Growth in the Animal Husbandry sub-sector is due to increased demand for small Animal Husbandry exports such as pork and lamb.

In the Fishery sub-sector, the development of Economic Growth in the Fishery subsector and FTT in the Fishery sub-sector has fluctuated, where there is a contraction of Economic Growth in the first quartile to the second quartile of 2020 and a sharp decline that has also occurred in FTT for the first quartile to second quartile periods of 2020. This occurred in the Fishery sub-sector due to a decline in Cultivated Fish production due to the COVID-19 pandemic which hampered production activities and decreased demand.

Apart from being viewed from the development pattern of each sector, Pearson correlation testing was also carried out in each subsector so that it can illustrate how much significance the strength of the relationship in each subsector is presented in the following table.

Table 3. Pearson correlation test between the Economic Growth and FTT each subsector

Subsectors	Pearson Correlation	Prob.	Correlation Level
Food Crops	-0.374	0.019**	Low
Horticulture Crops	-0.099	0.547	Very Low
Estate Crops	0.350	0.029**	Low
Animal Husbandry	0.336	0.037**	Low
Fishery	0.331	0.039**	Low

**) significant at 0.05 level.

Source: Processed data

Based on the results of the Pearson correlation test, it can be seen that the significant sub-sectors are the Food Crops, Estate Crops, Animal Husbandry, and Fishery sub-sectors, while the Horticulture Crops sub-sector has no significant effect. This condition indicates that there is a correlation between Economic Growth and FTT in each sub-sector, namely the Food Crops sub-sector of -0,374 which indicates an inversely proportional relationship with a low level of correlation; the Estate Crops sub-sector of 0.350 which shows a unidirectional relationship with a low level of correlation; the Animal Husbandry sub-sector of 0.336 which shows a unidirectional relationship with a low level of correlation; and the Fishery sub-sector of 0.331 which shows a unidirectional relationship with a low correlation level.

In more depth, it can be seen from the Granger Causality test in each subsector related to the causal relationship between Economic Growth and FTT, the test results can be seen in the following table.

Table 4. Pairwise Granger Causality Test of Economic Growth and FTT for each subsector

Subsectors	Null Hypothesis:	F-Statistic	Prob.
Food Crops	FTT does not Granger Cause Economic Growth	1.62384	0.4436
	Economic Growth does not Granger Cause FTT	14.5008	0.0663*
Horticulture Crops	FTT does not Granger Cause Economic Growth	0.16532	0.8483
	Economic Growth does not Granger Cause FTT	4.82756	0.0147**
Estate Crops	FTT does not Granger Cause Economic Growth	4.64948	0.0512*
	Economic Growth does not Granger Cause FTT	0.79997	0.6494
Animal Husbandry	FTT does not Granger Cause Economic Growth	0.97670	0.4663
	Economic Growth does not Granger Cause FTT	2.80037	0.0383**
Fishery	FTT does not Granger Cause Economic Growth	4.77401	0.0153**
	Economic Growth does not Granger Cause FTT	0.15588	0.8563

***) significant at 0.05 level, *) significant at 0.10 level.

Source: Processed data

The results of the Granger Causality test show that there is a direct relationship between Economic Growth and the FTT of each subsector. In the Food Crops sub-sector, there is a unidirectional relationship where Economic Growth affects FTT, while FTT cannot affect Economic Growth. In the Horticultural Crops sub-sector, the same conditions are also shown, namely that there is a unidirectional relationship where Economic Growth affects FTT while FTT does not affect Economic Growth. In the Estate Crops sub-sector, there are different conditions, namely, there is a unidirectional relationship where FTT affects Economic Growth. In the Animal Husbandry sub-sector, there is a unidirectional relationship where Economic Growth affects FTT, while FTT cannot affect Economic Growth. In the Fishery sub-sector, there is a unidirectional relationship where FTT affects Economic Growth, while Economic Growth cannot affect FTT.

4. CONCLUSIONS

Based on the description in the analysis section, it can be concluded that in general, the pattern of Economic Growth in the agricultural sector and Farmer's Term of Trade s fluctuate, where if we look more deeply the Economic Growth of the agricultural sector with FTT shows a leading pattern for Economic Growth against FTT which shows that Agriculture Growth can It is used to predict Farmer's Term of Trade, meanwhile Farmer's Term of Trade cannot predict Agriculture Growth. Besides, it is observed that each sub-sector is proven to have their respective characteristics with a fluctuating pattern where the relationships formed generally have a unidirectional relationship wherein the Food Crops, Horticulture Crops, and Animal Husbandry subsectors the relationships formed indicate that Economic Growth can be used to predict FTT. Meanwhile, in the Estate Crops and Fishery subsector, the relationship that is formed shows that FTT can be used to predict Economic Growth.

From the results of the analysis and conclusions, recommendations can be given in the form of strengthening the agricultural sector to maintain economic conditions both from the demand and supply side because the agricultural sector is highly dependent on natural conditions. Strengthening that can be done can be in the form of utilization of season predictions to overcome crop failures as well as the creation of substitute products in the agricultural sector so that production in the agricultural sector becomes strong. Besides, in terms of price as a measure of the purchasing power and exchange power of farmers, the government needs control over fluctuations in agricultural prices as a result of seasonal effects so that both the production side and the purchasing power and the exchange of farmers are more controlled by the government.

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