Analysis of factors affecting farmer exchange rate in North Sumatera Province

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Abstract. Increasing the overall welfare of the population means increasing the welfare of the rural population by paying attention to the development in the agricultural sector. In addition to economic growth data, to determine the success of the progress, data to measure the level of farmer welfare is also needed. One indicator that shows the welfare of farmers and rural economic conditions is the Farmer Exchange Rate (NTP). The research objective is to analyse the effect of inflation, interest rates, labour, GDP, and previous farmer exchange rates on the exchange rate of farmers in North Sumatra Province. The data used is secondary data from 1989-2018. The analysis model used is autoregressive. The results show that partially inflation, labour, and the exchange rate of farmers in the past have a beneficial and significant impact on the exchange rate of farmers. While, simultaneously inflation, interest rates, labour, GDP, and past exchange rates together with the important impact on value. The exchange of farmers in North Sumatera Province.

1. Introduction
The Agricultural division is one of the supporting areas for the economy of North Sumatera Province, which is a sector relatively more elastic and flexible to economic crises than other sectors because it relies more on the use of domestic resources than on imported components. Given more than a moiety of the population of North Sumatera lives in rural areas. Most of them still depend on the agricultural sector. Hopefully, this Agricultural sector will become a growth engine that can increase farmer’s income and be able to alleviate poverty.

North Sumatera Province is one of the regions which has a high potential for the development of the agricultural sector, and some of the commodities produced become export commodities. The Agricultural division is one of the reliable sectors that makes a higher contribution to the formation of Gross Regional Domestic Product (PDRB) of North Sumatera compared to other sectors, wherein 2018 the agricultural sector made a large contribution to GRDP of North Sumatera, amounting to 20.92% [1]. Agricultural development aims to improve the welfare of the Agricultural sector community. Given the Agricultural sector is a sector related to people's lives. The Agricultural sector is an economic sector based on local resources that has a significant role in the development of a country, especially developing countries such as Indonesia. The familiarization of agricultural growth towards raising the welfare of farmers will be very relevant to assess the impact of construction carried out in raising the well-being of farmers. So, it can be an input for the implementation of agricultural development [2].
The goal of development is to increase the welfare of the community. So, in every stage of development, the welfare of society always the central goal. As an agricultural country with a large population and a dominant proportion of households working in agriculture, attention to the welfare of farmers by considered very strategically. One of the measuring tools for farmers’ welfare currently used is The Farmer Exchange Rate (NTP) [3].

The farmer exchange rate is one of the tools that can be used to evaluate the welfare of farmers. The farmer exchange rate is able to describe the relationship between the sale of products produced and the purchase of goods and services consumed by farmers. [4]. Farmers' exchange rates have been measured through NTP. If Farmers’ NTPs are >100, it means that the index received by farmers is higher than what is paid by farmers. If = 100 when the index received by farmers with farmer expenses is the same, for <“100 the index received by farmers is smaller than what the peasants pay.

Farmer Exchange Rates have grouped into three parts, namely:

a. Farmers' exchange rates Value > 100, it means that the farmers experience a surplus.
b. Farmers' exchange rates Value = 100, meaning that the farmers break even.
c. Farmers' exchange rates value < 100, means that the farmers experience a deficit [5]

There is practically no different welfare for farming households. So, NTP is the only choice for agricultural development observers in assessing the level of well-being of farmers. Thus, NTP is a symbol of the relative level of the welfare for farmers. The higher the NTP, the relatively more prosperous the level of life of the farmer [6].

Besides, seeing the level of well-being of farmers overall needs to see in the other view, namely the progress of their total expense for consumption and production needs. In this case, the farmers as producers and consumers are shown the choices in allotting their revenue, namely: Firstly, to meet primary needs (especially consumption) for the continuance of the farmers and their families. Second, expenses for agricultural production/cultivation, which is a field of livelihood, which includes operational expenses for production and investment or the structure of capital goods. A second element is only possible if the primary needs of farmers have been answered by it. So, investment and also the forms of capital goods are the deciding elements for the level of farmer welfare [7].

Based on the background has been described, it shows that the farmer exchange rate is so important as a tool to assess the welfare of farmers. Knowing the welfare of farmers in North Sumatra can be a reference for formulating policies that can increase NTP for the welfare of farmers in North Sumatra. For this reason, researchers are interested in examining whether inflation, interest rates, labour, GRDP, and previous farmer exchange rates affect the exchange rate of farmers in North Sumatra Province.

2. Research methods

2.1. Method of data collection
The data that use for this research is the secondary data in the form of time-series data from 1989-2018. Secondary data used were obtained from the Central Statistics Agency (BPS) and other related agencies as well as literature related to this research. Types of data collected include farmer exchange rates, inflation, interest rates, labour, and Gross Regional Domestic Product (GRDP).

2.2. Data analysis method
The data used were analysed using an autoregressive model with the following equation model:

$$ Y = \alpha + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + \mu $$

Where:
- $Y$ = Farmer Exchange Rate
- $a_0$ = Constant
- $B_1 - B_5$ = Regression Coefficient
- $X_1$ = Inflation (%)
X2 = Interest rate (%)
X3 = Labour (Person)
X4 = GDRB (Rp)
X5 = Previous farmer exchange rate
μ = Error

3. Results and Discussion

3.1. Normality Test

![Histogram of Factors Affecting the Sumatran Farmer Exchange Rate](image)

**Figure 1.** The histogram of the factors affecting the Sumatran farmer exchange rate

Based on the results of data analysis using Eviews, it can be seen that the sig value of 0.334944 > 0.05 means that the data is normally distributed

3.2. Multicollinearity Test

| Variable | Coefficient Variance | Uncentered VIF | Centred VIF |
|----------|-----------------------|----------------|-------------|
| C        | 343.6201              | 882.1953       | NA          |
| P        | 0.006751              | 5.395918       | 3.640092    |
| R        | 0.045169              | 21.36125       | 5.581987    |
| TK       | 1.62E-11              | 282.6839       | 1.265210    |
| PDRB     | 3.68E-16              | 4.584632       | 2.216221    |
| NTP(-1)  | 0.017206              | 399.4697       | 1.772967    |

Based on Table 1 it is known that the VIF value <10, it can be concluded that the regression does not occur multicollinearity or perfect correlation between the independent variables.
3.3. Heteroscedasticity test

| Table 2. Heterocedasticity test table |
|--------------------------------------|
| F-statistic                          | 0.694027 | Prob. F(5,23) | 0.6332 |
| Obs*R-squared                        | 3.801793 | Prob. Chi-Square(5) | 0.5783 |
| Scaled explained SS                  | 3.819634 | Prob. Chi-Square(5) | 0.5757 |

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 08/30/20 Time: 22:27
Sample: 1990 2018
Included observations: 29

| Variable | Coefficient     | Std. Error    | t-Statistic | Prob.     |
|----------|-----------------|---------------|-------------|-----------|
| C        | 79.72425        | 92.43740      | 0.862467    | 0.3973    |
| P        | 0.379071        | 0.409718      | 0.925201    | 0.3645    |
| R        | -1.614922       | 1.059816      | -1.523776   | 0.1412    |
| TK       | -2.38E-06       | 2.01E-05      | -0.118316   | 0.9068    |
| PDRB     | -1.23E-07       | 9.57E-08      | -1.281625   | 0.2127    |
| NTP(-1)  | -0.457688       | 0.654098      | -0.699723   | 0.4911    |

Based on the results of data analysis using Eviews, it can be seen that the correlation value of the two independent variables with Unstandardized Residual has a significance value of more than 0.10. because the sig value is 0.6332 more than 0.10, there is no symptom of heteroscedasticity

3.4. Autocorrelation test

| Table 3. Autocorrelation test table |
|-------------------------------------|
| Breusch-Godfrey Serial Correlation LM Test: |
| F-statistic                        | 2.861047 | Prob. F(2,21) | 0.0796 |
| Obs*R-squared                      | 6.209870 | Prob. Chi-Square(2) | 0.0448 |

Based on the Table 3, the p value of the Obs * R square value <0.10 indicates that there is no autocorrelation

3.5. Regression analysis

Based on the results of calculations simultaneously or collectively, a significance value of 0.000001 < alpha 0.10 is obtained, it indicates that inflation, interest rates, labour, GDP and past exchange rates together have a significant effect on North Sumatra Province Agricultural Farmers' Exchange Rate. The regression equation can be written as follows:

\[ Y = 3.396795 - 0.146448 \text{Inflation} + 0.189131 \text{Interest rate} + 7.46E-06 \text{Labour} + 1.71E-08 \text{GDRB} + 0.742617 \text{NTP} (-1) \]  

(2)
Table 4. Results of data processing on factors that influence farmer exchange rates

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C        | 3.396795    | 18.53699   | 0.183244    | 0.8562|
| Inflation| -0.146448   | 0.082163   | -1.782407   | 0.0879|
| Interest rate | 0.189131 | 0.212531   | 0.889900    | 0.3827|
| Labour   | 7.46E-06    | 4.03E-06   | 1.850381    | 0.0771|
| GDRB     | 1.71E-08    | 1.92E-08   | 0.892453    | 0.3814|
| NTP(-1)  | 0.742617    | 0.131170   | 5.661488    | 0.0000|
| R-squared| 0.773946    |            |             |       |
| Adjusted R-squared | 0.724803 |            |             |       |
| F-statistic| 15.74909 |            |             |       |
| Prob(F-statistic) | 0.000001 |            |             |       |

3.6. Effect of inflation on farmer exchange rates
The effects of the inflation regression coefficient price are 0.146448, that means that if inflation will increase by way of one percent, it will minimize the farmer alternate fee with the aid of 0.146 one unit. Here shows that there is a bad impact between the inflation rate and the farmer exchange rate. Where the statistical Prob value is 0.0879 motion has a big have an impact on on the farmer exchange rate. the results showed that inflation has a terrible and tremendous effect on the trade price of farmers [8].

3.7. Effect of interest rates on farmer exchange rates
The outcomes of the regression coefficient cost of the pastime rate are 0.189131, that means that if the hobby rate will increase by one percent, it will amplify the increase in the farmer's change rate via 0.189 one unit. It suggests there is a wonderful have an effect on between interest charges and farmer alternate rates. Where the statistical Prob cost is 0.38271> 0.10, then H0 is time-honored and H1 did reject, so the pastime motion has no sizeable impact on the farmer alternate rate. he consequences of the learn about show that pastime rates have a big impact on farmer trade fees [9].

3.8. Effect of labour on farmer exchange rates
The outcomes of the labour regression coefficient value are 7.46E-06, meaning that if the workforce increases by one million people, it will increase the increase in the farmer exchange rate by 0.746 one unit. It shows there is a positive influence between the number of workers and the exchange rate of farmers. Where the statistical prob value is 0.0771 <0.10, then H0 is rejected and H1 is accepted, so the number of workers has a significant effect on the farmer exchange rate. The variable wages of labour in the agricultural sector did not have a significant effect on the exchange rate of farmers [10].

3.9. Effect of GRDP on farmer exchange rates
The outcomes of the regression coefficient value of the GRDP value are 1.71E-08, meaning that if the GRDP value increases by one million rupiahs, it will increase the increase in the farmer exchange rate by 0.0171 one unit. It shows there is a positive influence between the GRDP value and the farmer exchange rate. Where the statistical Prob value is 0.3814> 0.10, then H0 is accepted and H1 is rejected so that the GRDP has no significant effect on the farmer exchange rate. The results showed that the GRDP variable did not has a vast impact on the exchange rate of farmers [11].

3.10. Influence of the exchange rate of the previous year on farmer exchange rates
The results of the analysis of the regression coefficient value of the previous exchange rate were 0.742617, meaning that if the previous exchange rate increased by one unit, it would increase the increase in the farmer's exchange rate by 0.742617 one unit. It shows there is a positive influence between the previous farmer exchange rate and the current farmer exchange rate. Where the statistical Prob value is 0.000 < 0.10, then H0 is rejected. So, the previous farmer exchange rate has a vast
impact on the exchange rate of farmers in current conditions. The results of the study show that the farmer exchange rate in the past influenced the current exchange rate [12].

4. Conclusions
Partialiy, inflation, labour, and farmer exchange rates have a positive and significant impact on farmer exchange rates, while interest rates and GDP have no significant effect on farmer exchange rates. Simultaneously, inflation, interest rates, labour, GDP, and exchange rates together with have a significant effect on the exchange rate of farmers in North Sumatra Province. Suggestions for the government to stabilize and increase the exchange rate of farmers must formulate policies to stabilize inflation and increase the number of workers through job creation so that farmers' welfare can increase.

References
[1] [BPS] Central Bureau of Statistics 2019 North Sumatra in Numbers (Medan: Central Statistics Agency of North Sumatra Province)
[2] Rachmat M 2013 Nilai tukar petani: Konsep, pengukuran dan relevansinya sebagai indikator kesejahteraan petani [Farmer Exchange Rate: Concept, Measurement, and Relevance as Indicator of Farmer Welfare] Forum Penelitian Agro Ekonomi 31 2 pp 111-22
[3] Indraningsih K S 2016 Pengaruh penyuluhan terhadap keputusan petani dalam adopsi inovasi teknologi usahatani terpadu [The influence of extension on farmers' decisions in adopting integrated farming technology innovations] Jurnal Agro Ekonomi 29 1 pp 1-24
[4] Rata D, Putra D P E and Hendrayana H 2012 Coastal Aquifer Groundwater Modeling in the Southern Part of Yogyakarta Area, Indonesia Journal of Applied Geology 4 1
[5] National Development Planning Agency 2013 Analysis of Farmer Exchange Rates (NTP) as Material for Preparing the 2015-2019 RPJMN (Jakarta: BAPPENAS)
[6] Simatupang P and Isdiyoso B 1992 Pengaruh Pertumbuhan Ekonomi Terhadap Nilai Tukar Sektor Pertanian Landasan Teoritis dan Bukti Empiris [The Effect of Economic Growth on Agricultural Sector Exchange Rates Theoretical Basis and Empirical Evidence] Ekonomi dan Keuangan Indonesia 40 1
[7] Dachi B I 2016 Analisis Faktor-Faktor yang Mempengaruhi Pertumbuhan Sektor Pertanian di Provinsi Sumatera Utara [Analysis of Factors Affecting Growth in the Agricultural Sector in North Sumatra Province] Jurnal Universitas Sumatera Utara
[8] Faridah N and Syechalad M N 2016 Analisis faktor-faktor yang mempengaruhi nilai tukar petani sub sektor tanaman padi di Aceh [Analysis of Factors Affecting the Exchange Rate of Farmers in the Sub-Sector of Rice Crops in Aceh] Jurnal Ilmiah Mahasiswa Ekonomi Pembangunan 1 1 pp 169-76
[9] Nirmala A R, Hanani N and Muhaimin A W 2016 Analisis faktor-faktor yang mempengaruhi nilai tukar petani tanaman pangan di Kabupaten Jombang [Analysis of Factors Affecting Food Crops in Jombang Regency] Habitat 27 2 pp 66-71
[10] Zulmeida S 2016 Analysis of Farmer Exchange Rates in West Lombok Regency Thesis University of Mataram, Mataram
[11] Istiana F A 2018 Analysis of Factors Affecting Farmer Exchange Rates in Indonesia Thesis (Yogyakarta: Yogyakarta Islamic University)
[12] Keumala C M and Zamzami Z 2018 Indicators of Farmer Welfare through Farmer Exchange Rate (NTP) and Sharia Financing as Solutions Economica Journal of Islamic Economics

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