

Exploring the Causal Relationship Between Economic Growth and Farmer's Exchange Rate: Evidence from West Nusa Tenggara Province, Indonesia

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Abstract

Economic growth is influenced by various factors, including the contribution of the agricultural sector. Within the micro-analysis of this sector, the farmer's exchange rate (NTP) can impact the rate of economic growth in a region. This study analyzes the causal relationship between economic growth and NTP in West Nusa Tenggara Province, Indonesia using the Granger causality test. The findings reveal no significant causal relationship between economic growth and NTP. The study recommends further research to explore and assess other micro variables that may influence economic growth, thereby enabling policymakers to implement strategies that strengthen the agricultural sector's contribution to economic development.

Keywords: *Economic Growth, Farmer Exchange Rate, Granger Causality, Agricultural Economics, Regional Economic Development, Agricultural Sector.*

INTRODUCTION

According to classical economic growth theory, as developed by David Ricardo (Effendy et al., 2021), the four driving factors for economic growth include population, capital, land and natural resources, and the level of technology. An economy may be categorized as growing if per capita output increases over the long term, as conveyed by Sri Hartati (2021), who interprets economic growth as a process of sustained increases in per capita output. This long-term growth reflects improved welfare, as it provides

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greater alternatives for consuming goods and services, accompanied by an increase in purchasing power.

Economic growth is also linked to the increase in the production of goods and services within an economy, and it can be said that growth concerns development measured by increased production and income. This implies a rise in national income, as indicated by the magnitude of the Gross Domestic Product (GDP).

As a developing country, Indonesia is actively pursuing planned and gradual development, while also striving for equity and stability. As an agrarian nation, Indonesia is endowed with abundant natural resources, both on land and at sea. The country is also renowned for its agrarian nature, with a large portion of the population engaged in farming. Farmers play a crucial role in Indonesia, contributing to efforts to improve community welfare and economic development. As state revenue from the agricultural sector increases, so too does the welfare of farmers.

According to the Indonesian Statistics Agency, Indonesia's economic growth in the first quarter of 2024 was 5.11 percent higher than in the first quarter of 2023 (year-on-year). However, growth occurred across all sectors except for Agriculture, Forestry, and Fisheries, which contracted by 3.54 percent. In West Nusa Tenggara Province, economic growth in the first quarter of 2024, compared to the first quarter of 2023, was 4.75 percent. This growth is based on the results of the March 2024 Sample Area Framework (KSA), which showed that rice production in the first quarter of 2024 decreased by more than 330 thousand tons of Dry Milled Rice (GKG) compared to the first quarter of 2023, dropping from 597 thousand tons to 266 thousand tons of GKG.

Figure 1. Economic Growth Data for NTB 2019-2023

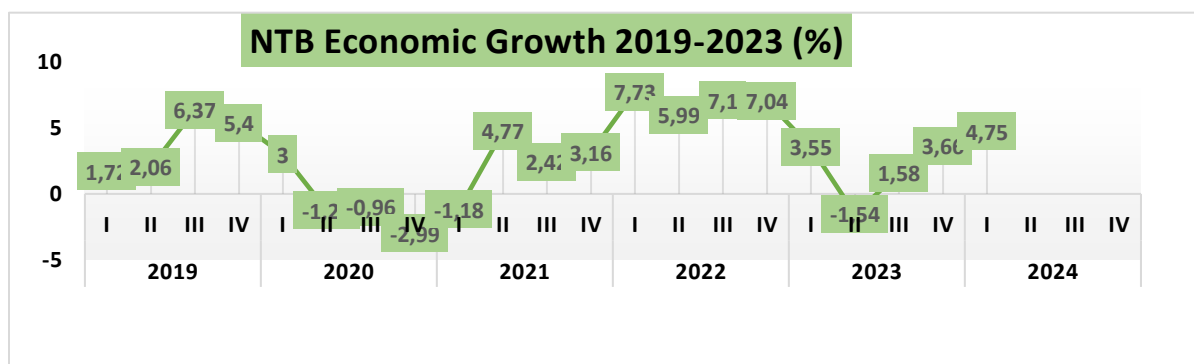


Figure 1 illustrates economic growth in West Nusa Tenggara Province over the last five years, highlighting that 2020 experienced the most significant decline, with a -0.64 percent decrease from 2019 due to the impact of COVID-19. One factor influencing economic growth is the agricultural sector, where increased output and income can raise the price index paid by farmers, enhance productivity, and add value, ultimately improving farmers' welfare.

The relationship between economic growth and farmers' welfare is complex and influenced by various factors, including agricultural and non-agricultural sectors, inflation, and overall welfare. Mulyawan & Fakhruddin (2022) suggest that farmers, as drivers in the agricultural sector, are expected to experience prosperity, particularly through increased purchasing power. One instrument used to monitor farmers' purchasing power is the Farmer Exchange Rate (NTP).

The Farmer Exchange Rate (NTP) is a comparison of the price index received by farmers (I_t) to the price index paid by farmers (I_b). NTP is a key indicator of the purchasing power of farmers in rural areas. It also reflects the exchange power (terms of trade) of agricultural products with goods and services consumed, as well as production costs. NTP serves as a crucial indicator to measure the welfare of farmers and the capacity to acquire necessary commodities for both production and household consumption.

Over the past five years, several studies have explored the causality between economic growth and NTP. For instance, Syifa Aulia et al. (2021) found that GDP positively and significantly affects NTP in Indonesia, while Indah et al. (2023) observed a similar effect in Lampung Province. On the other hand, Rahman & Sangeran (2022) revealed that economic growth has a positive but insignificant effect on NTP in South Sulawesi Province, and Istiana (2018) indicated that total GDP negatively and significantly affects NTP in Indonesia.

Other research on economic growth has examined broader variables, such as its impact on poverty (Ratundima et al., 2023) and the Gini ratio in Indonesia (Enggar Wishartama et al., 2022). Additional factors influencing economic growth include the agricultural sector (Prime, 2023), inflation (Kartika & Pasaribu, 2013; Simanungkalit, 2020), MSME growth (Halim, 2020), unemployment rates (Yuniarti et al., 2020), exports, and imports. Astuti & Ayuningtyas (2018) found that only exports affect economic growth, while imports do not. Anggraini & Warsitasari (2021) noted that the open unemployment rate, Gini ratio, poverty, and minimum wage collectively influence economic growth in East Java Province. More broadly, Victor (2015) discovered a long-term equilibrium



relationship between agricultural export variables and economic growth in Nigeria, similar to findings by Singh & Kumar (2018) in India, which identified a two-way relationship between GDP and exports.

Meanwhile, Pamungkasih et al. (2021) found that NTP affects life expectancy in East Nusa Tenggara. Another study indicated that land area and selling prices impact NTP, while fertilizer prices, family dependents, labor wages, and inflation do not (Rosihan et al., 2016). Kurniawan (2022) suggested that non-farming income, food expenditure, and household expenditure significantly affect NTP, whereas farmer age, education, family size, and individual farming income do not.

The majority of existing studies have tested various variables to assess their impact on economic growth and NTP. However, inconsistencies remain in the findings on the causal relationship between economic growth and NTP. This gap highlights the need for further research to determine whether NTP affects economic growth or vice versa. This study aims to analyze the causality between economic growth and NTP in West Nusa Tenggara Province, considering three possible outcomes: economic growth affects NTP, NTP affects economic growth, or there is no effect at all between the two variables.

RESEARCH METHOD

This study employs a descriptive quantitative analysis method. The research utilizes secondary data obtained from the Central Statistics Agency (BPS), with time series data spanning from 2010 to 2023, presented on a quarterly basis. The sampling technique adopted in this research is purposive sampling, which involves selecting samples based on specific criteria. The analytical tool used is the Granger causality test, consistent with previous studies (Arfiani, 2019; Enggar Wishartama et al., 2022; Pamungkasih et al., 2021; Ratundima et al., 2023; Singh & Kumar, 2018; Utama & Mustika, 2022), to examine the causal relationship between the variables under study, specifically economic growth and the Farmer's Exchange Rate (NTP).

The Granger Causality Test is as follows:

Equation For variable X:

$$x_t = \sum_{i=1}^m \alpha_i x_{t-i} + \sum_{i=1}^n \beta_i x_{t-1} + e_1$$

Equation for variable Y:

$$y_t = \sum_{i=1}^m \lambda_i y_{t-i} + \sum_{i=1}^n \delta_i x_{t-1} + e_2$$

In the above equations:

α_i and β_i = coefficients for variable X.



λ_i and δ_i = coefficients for the Y variable.

E1 and E2 = residue or error.

Interpretation of Equations

Equation for Variable X (Farmer Exchange Rate):

X_t = the value of the variable X at time t.

X_{t-i} = the value of the variable X at time t-i, with i being valid from 1 to m.

Y_{t-i} = the value of the variable Y at the time t-i, with i valid from 1 to n.

E1 = residue or error.

Equation for Variable Y (Economic Growth):

Y_t = the value of the variable Y at time t.

Y_{t-i} = the value of the variable Y at the time t-i, with i valid from 1 to m.

X_{t-i} = the value of the variable X at time t-i, with i being valid from 1 to n.

E2 = residue or error.

Before conducting a causality test, the first step is to regress using lag to get the smallest Akaike Info Criterion (AIC) value. There are four (4) possible causality test results, namely: (1) Economic growth affects NTP, (2) NTP affects Economic Growth, (3) There is a two-way relationship between Economic Growth and NTP, and (4) There is no relationship at all between Economic Growth and NTP.

RESULTS AND DISCUSSION

Economic Growth Conditions of West Nusa Tenggara from 2010-2023

To find out the economic growth of West Nusa Tenggara province in 2010 – 2023, we can see from the image below:



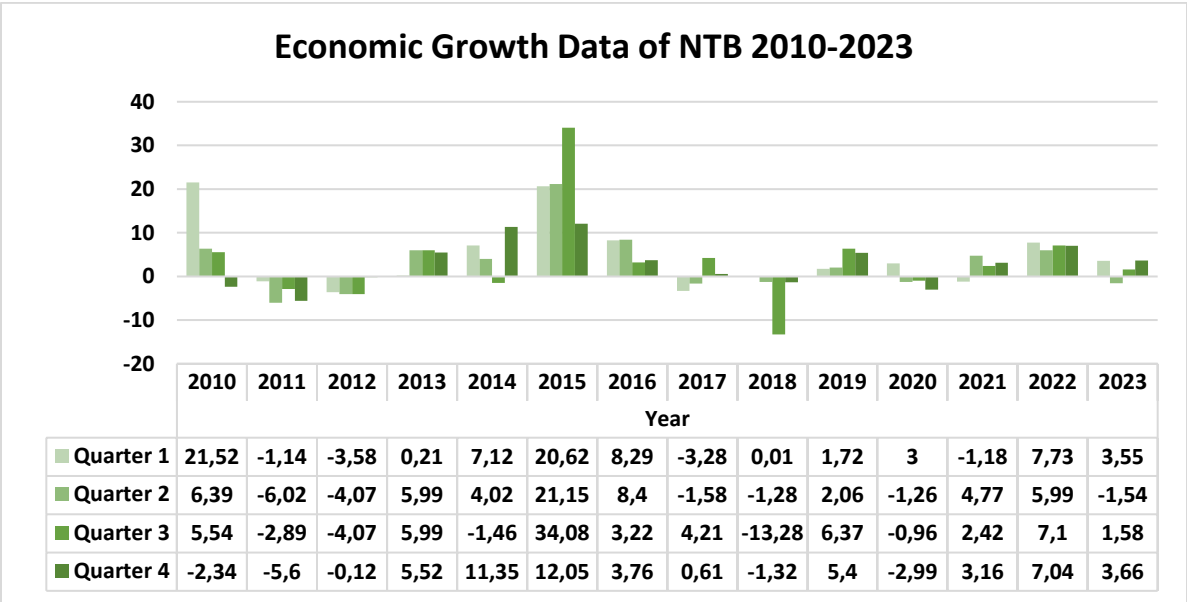
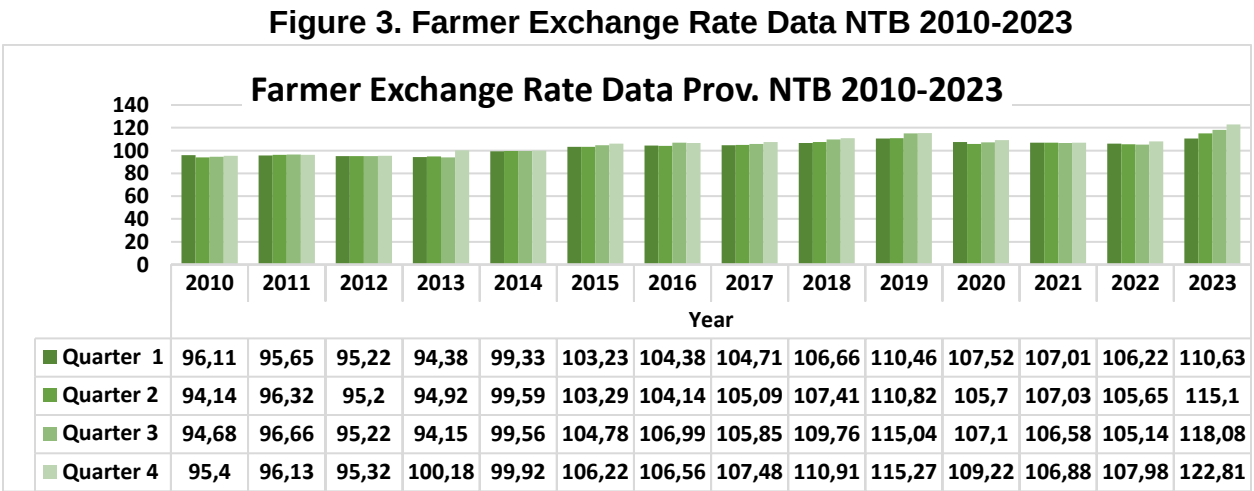


Figure 2. Economic Growth Data of NTB 2010-2023
Source : Central Statistics Agency of West Nusa Tenggara Provinc

Farmer Exchange Rate Conditions in West Nusa Tenggara from 2010-2023

To find out the data on the exchange rate of farmers in West Nusa Tenggara province in 2010 – 2023, we can see from the image below:



Source : Central Statistics Agency of West Nusa Tenggara Province



Granger Causality Test Results

Before conducting the causality test, a regression analysis between economic growth and the Farmer's Exchange Rate (NTP) in West Nusa Tenggara Province was performed using a vector autoregressive (VAR) model with lags ranging from 1 to 3. The regression with lag 1 produced an AIC value of 6.273195, while lags 2 and 3 yielded AIC values of 6.311453 and 6.366281, respectively. Among these, lag 1 had the smallest AIC value, indicating it as the most suitable model.

Based on the regression results with these lags, the smallest AIC value was consistently obtained with lag 1, confirming its appropriateness for further analysis. The Granger causality test with lag 1 revealed no causal relationships, either unidirectional or bidirectional, between the variables of Economic Growth (PE) and the Farmer's Exchange Rate (NTP). Specifically, the Granger causality test showed that Economic Growth (PE) does not Granger-cause NTP, with an F-statistic of 0.01096 and a probability of 0.9170. Similarly, NTP does not Granger-cause Economic Growth (PE), as indicated by an F-statistic of 0.10233 and a probability of 0.7503.

DISCUSSION

This research indicates that there is no significant causal relationship between economic growth and the Farmer's Exchange Rate (NTP) in West Nusa Tenggara Province. When compared with studies examining the impact of the agricultural sector on economic growth, this research may serve as an additional reference in the agricultural economics literature, alongside previous studies such as those by Indah et al. (2023) and Syifa Aulia et al. (2021). In general, the findings of these studies highlight a positive contribution of the agricultural sector to economic growth, which aligns with the work of Prima (2023). However, at a micro level, this study shows that NTP does not significantly support economic growth, which contrasts with the findings of Rahman & Sangeran (2022). This suggests that other factors within the agricultural sector, beyond NTP, may contribute to economic growth across different regions and countries, as noted by Istiana (2018). Therefore, the findings of this research recommend the need for broader studies on other micro variables within the agricultural sector that may better support its role in influencing overall economic growth.



CONCLUSION

This study found no significant causal relationship between economic growth and the Farmer's Exchange Rate (NTP) in West Nusa Tenggara Province. Consequently, further research is warranted to examine more micro-variables within the agricultural sector that may positively contribute to GDP growth. Such insights could provide valuable policy recommendations for decision-makers to enhance the agricultural sector's role in supporting regional economic growth.

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APPENDIX

Regression Test Results using Lag 1

Dependent Variable: PE Method: Least Squares Date: 08/04/24 Time: 17:49 Sample (adjusted): 2010Q2 2023Q4 Included observations: 55 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PE(-1)	0.645446	0.095951	6.726851	0.0000
NTP(-1)	0.037153	0.116142	0.319892	0.7503
C	-2.939552	12.06729	-0.243597	0.8085
R-squared	0.466044	Mean dependent var	3.165818	
Adjusted R-squared	0.445507	S.D. dependent var	7.286397	
S.E. of regression	5.425762	Akaike info criterion	6.273195	
Sum squared resid	1530.822	Schwarz criterion	6.382686	
Log likelihood	-169.5129	Hannan-Quinn criter.	6.315536	
F-statistic	22.69317	Durbin-Watson stat	1.874374	
Prob(F-statistic)	0.000000			

Source: Granger causality data Eviews

Regression Test Results using Lag 2

Dependent Variable: PE Method: Least Squares Date: 08/04/24 Time: 17:52 Sample (adjusted): 2010Q3 2023Q4 Included observations: 54 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PE(-1)	0.681073	0.139721	4.874519	0.0000
PE(-2)	0.020626	0.131770	0.156532	0.8763
NTP(-1)	0.157261	0.371825	0.422943	0.6742
NTP(-2)	-0.167534	0.385284	-0.434832	0.6656
C	1.881928	12.70883	0.148080	0.8829
R-squared	0.493346	Mean dependent var	3.106111	
Adjusted R-squared	0.451987	S.D. dependent var	7.341222	
S.E. of regression	5.434553	Akaike info criterion	6.311453	
Sum squared resid	1447.184	Schwarz criterion	6.495618	
Log likelihood	-165.4092	Hannan-Quinn criter.	6.382478	
F-statistic	11.92826	Durbin-Watson stat	2.005527	
Prob(F-statistic)	0.000001			

Source: Granger causality data Eviews

Regression Test Results using Lag 3

Granger Causality Test Results



Dependent Variable: PE				
Method: Least Squares				
Date: 08/04/24 Time: 18:01				
Sample (adjusted): 2010Q4 2023Q4				
Included observations: 53 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
PE(-1)	0.680360	0.144675	4.702669	0.0000
PE(-2)	0.118539	0.172290	0.688018	0.4949
PE(-3)	-0.145212	0.134085	-1.082987	0.2845
NTP(-1)	0.079880	0.386193	0.206840	0.8370
NTP(-2)	0.233250	0.571743	0.407963	0.6852
NTP(-3)	-0.350143	0.395358	-0.885636	0.3804
C	4.773801	13.45551	0.354784	0.7244
R-squared	0.513560	Mean dependent var	3.060189	
Adjusted R-squared	0.450112	S.D. dependent var	7.403640	
S.E. of regression	5.490130	Akaike info criterion	6.366281	
Sum squared resid	1386.510	Schwarz criterion	6.626508	
Log likelihood	-161.7065	Hannan-Quinn criter.	6.466352	
F-statistic	8.094107	Durbin-Watson stat	2.022093	
Prob(F-statistic)	0.000005			

Source: Granger causality data Eviews

Pairwise Granger Causality Tests

Date: 08/04/24 Time: 18:03

Sample: 2010Q1 2023Q4

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
PE does not Granger Cause NTP	55	0.01096	0.9170
NTP does not Granger Cause PE		0.10233	0.7503

Source: Granger causality data Eviews

