INFINITE: Journal of Innovation, Financial, Business, and Technology
Vol 1 Issue 1 (2026)

Original Paper

Influence of the Progress of E-Commerce and Macroeconomic Variables on Farmers' Exchange Rates in Eastern Indonesia

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ABSTRACT

Study This aim for analyze the influence of e-commerce progress and the macro sector agriculture on the Farmer Exchange Rate (NTP) in the provinces of Central Indonesia, East Nusa Tenggara, Maluku, North Maluku, Papua, and West Papua. The method used is panel data regression with the Fixed Effect Model (FEM) approach based on Chow test and Hausman test results. Independent variables used covering e-commerce progress, the Products Gross Regional Domestic Product (GRDP) sector, agriculture, the exports sector, agriculture, and energy Work sector, agriculture. Research results show that, in a way, all variables are independent and significantly influential towards NTP. However, in general, partial only the variables of the export sector, influential agriculture, positive and significant towards NTP. Findings This shows that the involvement of the sector in the export market own role in increase welfare farmers in the Indonesian region east. Therefore, policy development in agriculture need directed at strengthening international market access, increasing Power competition in commodities, as well as development a more digital ecosystem inclusive for farmers.

ARTICLE INFO

Keywords:
Exchange Rate, E-Commerce, GRDP of Business Field, Export, Labor

JEL Code:
O33, Q12, L86, Q17

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1. INTRODUCTION

The agricultural sector plays a strategic role in the Indonesian economy as a key contributor to regional income. Farming households, consisting of individuals or groups managing agricultural activities, are a vital component of the rural socio-economic system. In Indonesia, this sector plays a major role in contributing to the Gross Regional Domestic Product (GRDP) of the agricultural sector, strengthening its position as a pillar of the regional economy. However, the sector's potential has not been fully optimized through effective and targeted policies.

The agricultural sector Still become bone of contention in some parts of large areas of Indonesia, especially the provinces of East Nusa Tenggara (NTT), Maluku, North Maluku, Papua, and West Papua. The role of the sector. This is not only important from the side of absorption power work, but also as a source of income House ladder rural areas (Todaro & Smith, 2020; BPS, various years). However, welfare farmers in the area of eastern Indonesia are still relatively left behind compared to the western region, which is reflected in the Farmer's Exchange Rate (NTP), which tends to be below the national average (BPS, 2023).

NTP is a common indicator used to measure the level of welfare of farmers, because reflect comparison between the index price received by farmers and the index price paid to farmers. An NTP that is above 100 shows that the income farmer relatively higher compared to expenditure, while an NTP below 100 indicates pressure on welfare farmers (BPS, 2023; Simatupang & Maulana, 2018). In the provinces of northern Indonesia East, NTP fluctuations are often influenced by limitations on market access, high-cost distribution, as well as the structure of production that is still small-scale and lacking integration with modern value chains (World Bank, 2023).

The development of e-commerce in one decade final open opportunity new opportunities for the sector, especially in expanding market access, cutting costs, and increase position of farmers. Digital platforms enable farmers or perpetrator business agriculture sell product in a way direct to consumers or a larger market, including interregional and export (FAO, 2023; OECD, 2024). In the context of the eastern region of Indonesia, which has challenges geographically and logistically, e-commerce has the potential become an instrument strategically for reducing market asymmetry and increase price received by farmers (World Bank, 2023).

On the other hand, performance sector agriculture is also greatly influenced by macroeconomic variables, such as Gross Regional Domestic Product (GRDP) in the field of business agriculture, value export commodities agriculture, as well as absorption power work in the sector agriculture. Increase in GRDP in the agricultural sector reflects output and value growth, which in turn potential increase income of farmers (Arsyad, 2016). Export agriculture can expand the market and improve the price of commodities, while investment plays a role in improving technology, infrastructure, and productivity (Krugman, Obstfeld, & Melitz, 2018; Jhingan, 2019). Labor reflects dimensions of social and the capacity of the production sector agriculture, although improved power without improved productivity can cause pressure on income per capita farmers (Lewis, 1954; World Bank, 2022).

Many studies show that the digitalization economy, including e-commerce, has a positive to performance of the sector and the welfare of farmers, especially in developing countries (FAO, 2023; OECD, 2024). However, some big study Still focused on a region or country with relatively advanced digital infrastructure, while studies empirically examined the role of e-commerce on NTP in underdeveloped and island regions like parts of Indonesia's east are still limited. Therefore, this research becomes relevant to fill the the in the literature with analyze influence of e-commerce progress and the macro sector of agriculture on NTP in the five provinces of Indonesia's eastern region.

2. LITERATURE REVIEW

2.1 Farmer's Exchange Rate (NTP)

Farmer's Exchange Rate is defined as the ratio between the index price received by farmers and the index price paid by farmers. NTP is widely used in a way wide by the institution statistics and researchers as an indicator of welfare for farmers. Literature shows that NTP is influenced by factors such as agricultural output prices, production input prices, inflation in rural areas, and government involvement in the agricultural sector.

2.2 E-commerce and the Agricultural Sector

E-commerce in the sector covers the use of digital platforms for marketing, distribution, and transactions in the product sector. Digitalization is believed capable increase market efficiency, transparency, price, and access farmer to information and consumers. Studies show that e-commerce adoption can increase the income of farmers and reduce dependence on middlemen, although the impact is highly dependent on the quality of digital infrastructure and literacy technology.

2.3 GRDP of the Agricultural Sector

Field GRDP business agriculture reflect mark added value generated by the sector of agriculture in a region. Growth of agricultural GRDP generally correlated positively with improvement in income for farmers, although the distribution of the benefits is not always even.

2.4 Export Agriculture

Export commodities in agriculture open access to the international market and have the potential increase the price sell product. Literature shows that areas with strong agricultural orientation tend to have higher performance income for farmers, though prone to fluctuations in global prices.

2.5 Labor Agriculture

Labor is a factor of production in agriculture. However, the increased amount of power without balanced improvement in productivity can lower income per farmer. Therefore, the influence of power on Work towards NTP is ambiguous and needs to be tested in an empirical.

3. METHOD, DATA, AND ANALYSIS

Study This use approach with panel data, combining dimensions of time and interprovincial.

Data used is secondary data annual of the five provinces of Indonesia East (NTT, Maluku, North Maluku, Papua, and West Papua) in the period 2010–2024. NTP data is obtained from the Central Statistics Agency (BPS). E-commerce data is proxied use indicator like the ICT development, percentage of resident internet users, or the number of perpetrators of e-commerce businesses. Data on agricultural GRDP, exports, and labor Work obtained from BPS and BKPM publications.

The econometric model used is panel data regression as follows:

$$NTP_{it} = \alpha + \beta 1\ ECOM_{it} + \beta 2\ GRDP_{it} + \beta 3\ EXP_{it} + \beta 4\ TK_{it} + \varepsilon_{it}$$

Selection of estimation model done through the Chow test, Hausman test, and Lagrange Multiplier test to determine whether the fixed effect or random effect model is most appropriate.

4. RESULT AND DISCUSSION

The selection of the panel data regression model is carried out through the Chow test and the Hausman test. The results of the Chow test showed mark probability of 0.0185 (< 0.05), so the Fixed Effect model is more appropriate compared to the Common Effect. Furthermore, the results of the Hausman test show a mark probability of 0.0019 (< 0.05), which indicates that the Fixed Effect Model (FEM) is more consistent compared to the Random Effect Model. Based on the second testing, therefore, FEM is selected as the main estimation model.

Fixed Effect Model Estimation Results

The results of the Fixed Effect Model estimation are presented in Table 1. Simultaneously, the results of the F test in **Table 2** show an F-statistic value of 4.2891 with a probability of 0.0086 (< 0.05). This signifies that variables e-commerce progress, sector GRDP agriculture, exports agriculture, and energy work in a way together, significantly influential on the Farmer Exchange Rate (NTP) in the provinces of Central Indonesia east.

Table 1. Fixed Effect Model Estimation Results (t-Test)

Variables	Coefficient	t- Statistics	Prob.	Information
E-commerce (X1)	-12,1766	-0.2909	0.7754	Not significant
Agricultural GRDP (X2)	0.1118	1.9336	0.0736	Not significant
Export Agriculture (X3)	0.00106	2,3348	0.0350	Significant
Labor Agriculture (X4)	-0.00086	-1.9061	0.0774	Not significant

Table 2. Simultaneous Fixed Effect Model Estimation Results (F Test)

Information	Mark
F-Statistic	4,2891
Probability	0.0086

In a way, the t-test results show that:

1. Variables e-commerce progress (X1) has a t-statistic value of -0.2909 with a probability of 0.7754 (> 0.05), which means no influential significance against NTP.
2. Field GRDP variables business agriculture (X2) has a t-statistic value of 1.9336 with a probability above 0.05, so that no influential significant against NTP.
3. Variables export sector agriculture (X3) has a t-statistic value is 2.3348 with a probability of 0.0350 (< 0.05), which means influential, positive, and significant against NTP.
4. Variables power Work sector agriculture (X4) has a t-statistic value of -1.9061 with a probability of 0.0774 (> 0.05), so no influential significant at the level 5 percent significance.

Equality regression obtained is:

$$NTP\_it = 9376.96 - 12.18X1\_it + 0.11X2\_it + 0.00106X3\_it - 0.00086X4\_it + \mu\_i + \varepsilon\_it$$

Discussion:
Estimation results show that e-commerce progress is not influential significant towards NTP. Findings: This indicates that although digitalization increases trading potential and market efficiency, the utilization of e-commerce in the agricultural areas of Indonesia is not optimal. Limitations of digital infrastructure, low literacy among technology farmers, as well as the still dominant traditional chain distribution, are allegedly become factor main factors that hinder e-commerce's contribution to improving the welfare of farmers. Findings. This is in line with the World Bank (2023) and FAO (2023), stating that the impact of e-commerce on income farmers is very dependent on the readiness of the digital ecosystem and logistics.

Sector GRDP variables, agriculture, also do not show a significant influence on NTP. This indicates that output and value growth, plus sector agriculture Not yet fully distributed to farmers, in particular, small farmers. Thus, the increase in performance of the macro sector of agriculture, in a way, automatic increase Power purchase and welfare for farmers. Findings. This is consistent with Arsyad (2016), who emphasized the existence gap distribution benefit growth in the sectoral.

On the other hand, exports sector of agriculture proven to be influential, positive, and significant towards NTP. Findings. This confirms that the involvement sector in the international market is capable increase price of commodities and the income of farmers. Access to export markets give opportunity mark add a more high and strong position, although still accompanied by risk fluctuations in global prices. These results are in line with the theory of international trade and the findings of Krugman et al. (2018).

Variables power, Work sector, and agriculture show a negative and non-significant effect on NTP. This can indicate that power works in the sector of agriculture in the Indonesian region of East Not yet in a direct way targeting small farmers, but more is used for capital-intensive activities or infrastructure whose benefits are felt in the long term. Findings. This supports Jhingan's (2019) view that impact investment to well-being depends heavily on the direction and quality of investment.

In a way, the results of the study show that although the model is significant in a simultaneous way, only the variables export sector and agriculture consistently play a role in improving the Farmers' Exchange Rate. Findings. This emphasize importance of policy strengthening market access and power competition export as the main strategy to increase the welfare of farmers in the provinces of Indonesia's East.

5. CONCLUSION AND SUGGESTION

Based on the analysis results, this study concludes that although simultaneously all variables have a significant effect, partially only agricultural sector exports are proven to have a positive and significant effect in increasing the Farmer's Exchange Rate (NTP) in five provinces in Eastern Indonesia, while the variables of e-commerce progress, agricultural sector GRDP, and agricultural labor have not shown a significant impact on the welfare of farmers in the region due to limited digital infrastructure, low technological literacy, and the unequal distribution of economic added value to small farmers.

Therefore, it is recommended for the government to prioritize policies to strengthen international market access and increase the competitiveness of export commodities, which are accompanied by the development of a more inclusive digital ecosystem and strengthening of integrated logistics infrastructure to ensure that economic growth in the agricultural sector can be distributed fairly and sustainably to all farming households.

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