



Research

## The progressivity of Farmers' terms of trade in accelerating fiscal policy for poverty alleviation programs in Gorontalo province

Fitri Hadi Yulia Akib <sup>1)</sup>, Syarwani Canon <sup>2)</sup>, Mahludin H. Baruwadi <sup>2)</sup>, Irawati Abdul <sup>2)</sup>,  
Mohammad Zubair Hippy <sup>3)</sup>, Mahyudin Humalanggi <sup>4)</sup>, Alfred Salindeho <sup>5)</sup>,  
Siti Rahmatia Machieu <sup>3)</sup>

<sup>1)</sup> Postgraduate in Economics, Universitas Negeri Gorontalo, Gorontalo, Indonesia

<sup>2)</sup> Postgraduate, Universitas Negeri Gorontalo, Gorontalo, Indonesia

<sup>3)</sup> Agribusiness Study Program, Universitas Negeri Gorontalo, Gorontalo, Indonesia

<sup>4)</sup> Regional Planning and Development Agency of Gorontalo Province, Gorontalo, Indonesia

<sup>5)</sup> Accounting Study Program, Sekolah Tinggi Bisnis dan Manajemen Dua Sudara Bitung, North Sulawesi, Indonesia

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### ABSTRACT

Fiscal policy plays a strategic role in promoting economic stability and poverty reduction in agriculture, yet rising Farmers' Terms of Trade do not always translate into lower farmer poverty. This study contributes by clarifying this paradox and assessing whether fiscal policy effectively improves farmers' welfare outcomes. This study aims to examine the progressivity of NTP and to analyze the extent to which NTP mediates the impact of agricultural fiscal policy on poverty reduction, given that poverty rates are predominantly concentrated among farming communities. The data used in this research is panel data comprising six districts/cities in Gorontalo Province over a ten-year period from 2015 to 2024. The data analysis methods employed include descriptive analysis and panel data path analysis. Before conducting the path analysis, the data were transformed using natural logarithms and standardized values to ensure that the beta coefficients from the equations could be used as path coefficients. The findings reveal that: (1) The progress of NTP in Gorontalo Province tends to remain above 100%, which indicates that farmers benefit from their farming activities. However, this figure does not necessarily represent that farmers are economically prosperous, as the surplus (profit/income) between farming revenue and farming costs often remains insufficient compared to the poverty line. This results in the phenomenon of high NTP values alongside persistent and significant levels of poverty. (2) The General Allocation Fund (DAU) has a positive but insignificant effect on NTP in Gorontalo Province. The Special Allocation Fund (DAK) also has a positive but insignificant effect on NTP. Similarly, NTP has a negative but insignificant effect on poverty levels in the province. Both DAU and DAK exhibit negative but insignificant direct effects on poverty. Furthermore, the indirect effects of DAU and DAK on poverty through NTP are also negative but statistically insignificant.

### KEYWORDS

Farmers' Terms of Trade;

Fiscal policy;

General allocation fund;

Poverty;

Special allocation fund

<sup>\*)</sup> Corresponding Author

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## INTRODUCTION

Gorontalo Province is a region where the majority of the population relies heavily on the agricultural sector. Poverty among farmers remains a persistent issue that challenges both economic development and social welfare in the province, especially considering Gorontalo's classification as the fifth poorest province in Indonesia. The province's extreme poverty rate stands at 8.17%, with three priority areas identified for extreme poverty alleviation efforts: Gorontalo Regency (6.92%), Pohuwato Regency (4.91%), and Bone Bolango Regency (3.23%). Agriculture remains the backbone of the rural economy, with the Farmers' Terms of Trade (NTP) serving as a key indicator for measuring both farmer welfare and economic efficiency in the agricultural sector (Aulia et al., 2021).

NTP is a critical indicator reflecting the ratio between the price index received by farmers for their products and the price index of goods and services they must purchase, which offers insight into farmers' purchasing power and overall economic capability (Kartika et al., 2023; Yacoub & Mutiaradina, 2020). Triatmo (2024) asserts a negative relationship between increasing NTP and poverty levels. Similarly, studies by Masruroh (2021), Baruwadi et al. (2022), Komolafe et al. (2022), and Imran et al. (2023) confirm that increased farmer income positively affects both farmer welfare and the economic stability of farming households.

This fiscal policy orientation is supported by relevant local regulations, including Governor Regulation of Gorontalo Province Number 38 of 2017 concerning the Implementation of Regional Regulation Number 1 of 2014 on the Protection of Sustainable Food Agricultural Land, and Governor Regulation Number 34 of 2024 concerning the Elaboration of Regional Revenue and Expenditure for the 2025 Fiscal Year. Together, these regulations provide a legal and budgetary basis for allocating regional fiscal resources, including DAU and DAK, to support agricultural development, protect productive farmland, and strengthen farmers' welfare in Gorontalo Province. According to Sitepu et al. (2022) and Pelengkahu et al. (2021), infrastructure development in agriculture financed by fiscal spending can positively influence NTP and the welfare of surrounding communities. However, questions remain regarding how effectively these fiscal policies have improved NTP and simultaneously reduced poverty, particularly whether NTP can serve as a mediating variable in poverty reduction. There is a

prevailing standard that NTP values above 100% indicate farmer prosperity (Harizahayu et al., 2023). Fiscal policies targeting agriculture encompass a range of components, including subsidies for production inputs, irrigation infrastructure development, research and innovation, and expanded access to markets and financial services, all of which have potential implications for poverty reduction (Arham & Dai, 2020; Utari et al., 2024).

These policies are expected to reduce farmers' financial burdens, increase productivity, and consequently improve NTP. Irrigation infrastructure, in particular, is a crucial element for enhancing water-use efficiency, which ensures sustainable agricultural production, and positively impact farmers' income and NTP (Bachewe et al., 2018; Khusaini et al., 2023; Maru et al., 2023). Research and development initiatives, especially those involving the adoption of modern agricultural technology, are expected to boost both yields and product quality (Diaz-Bonila et al., 2019). However, unforeseen commodity price fluctuations, climate change impacts that disrupt planting patterns, and the ongoing need for expanded infrastructure continue to pose significant barriers to achieving sustainable farmer welfare and consistent poverty reduction in Gorontalo Province. In response, the government has implemented various fiscal measures, particularly through DAU and DAK, to support programs directly related to agricultural activities.

The DAU and DAK allocated to the agricultural sector are aimed at strengthening production capacity, improving access to technology, and expanding market reach. At the same time, these funds are intended to enhance the socio-economic conditions of farmers through poverty alleviation programs (Arham & Payu, 2019; Kartika et al., 2023; Pandyaswargo et al., 2024). In addition to directing resources toward agricultural development, fiscal policy also adopts an inclusive approach by targeting improvements in the socio-economic well-being of farmers through structured poverty reduction efforts (Khusaini et al., 2023; Rammohan & Tohari, 2023). These programs include a variety of activities such as skill training and business capital assistance for vulnerable groups, particularly farmers (Rachmawatie & Prakoso, 2023; World Bank Group, 2020). Through such initiatives, the government aims to reduce economic inequality and provide equal opportunities across rural communities. Fiscal policy has the potential to influence the Farmers' Terms of Trade (NTP), which in turn can affect poverty levels. In this context, the general and special allocation funds (DAU and DAK) can contribute to increasing NTP, and a higher NTP may ultimately help reduce poverty in Gorontalo Province.

Although previous studies have examined the impact of DAU and DAK on poverty, the role of NTP as a welfare indicator, and the relationship between NTP and poverty, these strands of literature remain largely fragmented and inconclusive. Existing research often analyzes these

variables in isolation, without explicitly addressing the potential mediating role of NTP in linking fiscal transfers to poverty reduction. Moreover, empirical evidence at the regional level, particularly in Gorontalo Province, remains limited. This study fills this gap by integrating fiscal policy instruments, NTP, and poverty into a unified analytical framework, while also offering methodological novelty through the use of panel data path analysis to capture both direct and indirect relationships across districts/cities over time.

Aligned with Indonesia's development vision and its commitment to the Sustainable Development Goals (SDGs), particularly poverty eradication (SDGs 1 - no poverty), food security (SDGs 2 – zero hunger), and sustainable agriculture (SDGs 12 - responsible consumption and production in support), this study examines trends in the Farmers' Terms of Trade (NTP). It further evaluates fiscal policy in terms of its capacity to enhance NTP in a progressive manner and contribute to sustainable poverty reduction. Specifically, this study aims to analyze the progressivity of NTP and to investigate the extent to which NTP mediates the impact of agricultural fiscal policy, through DAU and DAK on poverty reduction in Gorontalo Province.

## METHOD

### *Research Approach*

This study employs a quantitative approach using both descriptive and correlational methods. The data used in this research are panel data, comprising six districts/cities in Gorontalo Province over a ten-year period from 2015 to 2024. The selection of Gorontalo Province as the research object is based on several considerations. First, the region has a strong dependence on the agricultural sector as a primary source of livelihood, making it highly relevant for analyzing farmers' welfare and poverty dynamics. Second, despite relatively stable NTP values, poverty remains significant, indicating a potential paradox that warrants further investigation. Third, the availability of consistent panel data across districts/cities over a ten-year period enables a more robust empirical analysis of both temporal and cross-sectional variations. The total number of data points is 60, which is considered appropriate for analysis purposes. As stated by Sugiyono in Murtisari et al. (2024), a minimum of 30 data points is sufficient for quantitative research analysis.

### *Data Collection*

Data collection was conducted through documentation techniques, utilizing data from Statistics Indonesia (BPS) and the Regional Government Financial Reports (LKPD) of Gorontalo Province. The dataset includes information on the General Allocation Fund (DAU) and Special Allocation Fund (DAK) allocated to the agricultural sector, the Farmers' Terms of

Trade (NTP), and poverty rates. The data collection procedure was carried out systematically through documentation techniques by accessing official secondary data from Statistics Indonesia (BPS) and the audited Regional Government Financial Reports (LKPD) of Gorontalo Province. Data were collected by identifying relevant variables, extracting annual data for each district/city over the 2015–2024 period, and verifying consistency across sources. The compiled dataset was then organized into panel data format to ensure comparability across time and regions before proceeding to further analysis.

### **Data Analysis Technique**

The data analysis consists of two main methods. First, descriptive analysis was employed to collect and process data based on actual conditions, which were then organized, analyzed, and interpreted to describe the existing issues, in this case, the trends in the Farmers' Terms of Trade (NTP) in Gorontalo Province. Second, panel data path analysis was used to determine the structural relationships between variables. Prior to performing the path analysis, all data were transformed using the natural logarithm and standardized into Standardized Values to allow the beta coefficients from the equations to be interpreted as path coefficients.

In this study, the normality test was conducted as a primary assumption to ensure that the data distribution meets the requirements for reliable estimation in path analysis, particularly since the interpretation of path coefficients depends on normally distributed residuals. Meanwhile, other classical assumption tests were not explicitly performed because the analysis emphasizes the overall structural relationships within a panel data path framework rather than isolated regression estimations. Given the use of standardized data and the model's focus on simultaneous direct and indirect effects, the normality assumption is considered sufficiently representative to support the robustness and validity of the model.

The equations used in this study are as follows:

$$POV_{it} = \alpha + \beta_1 FER_{it} + \beta_2 GAF_{it} + \beta_3 SAF_{it} + \varepsilon_{it} \quad (1)$$

$$FER_{it} = \alpha + \beta_1 GAF_{it} + \beta_2 SAF_{it} + \varepsilon_{it} \quad (2)$$

Description:

POV : Poverty (dependent variable; Y)

FER : Farmer's Exchange Rate (mediating variable; Z)

GAF : General Allocation Funding (independent variable; X1)

SAF : Specialization Allocation Funding (independent variable; X2)

$\alpha$  : Constant

$\beta$  : Regression Coefficient

After obtaining the results from Equation 1 and Equation 2, the indirect effect is then assessed using the Sobel test, which is employed to determine the significance of the mediating effect. The Sobel formula is as follows (Fernando et al., 2023; Li et al., 2024; Maulidiyah et al., 2025):

$$Sab = \sqrt{b^2 \cdot Sa^2 + a^2 \cdot Sb^2 + Sa^2 \cdot Sb^2}$$

$$Z_{value} = \frac{ab}{Sab}$$

Description:

*Sab* : Standard error of the indirect effect

*a* : Path coefficient from the independent variable (X) to the mediating variable (Z)

*b* : Path coefficient from the mediating variable (Z) to the dependent variable (Y)

*Sa* : Standard error of coefficient *a*

*Sb* : Standard error of coefficient *b*

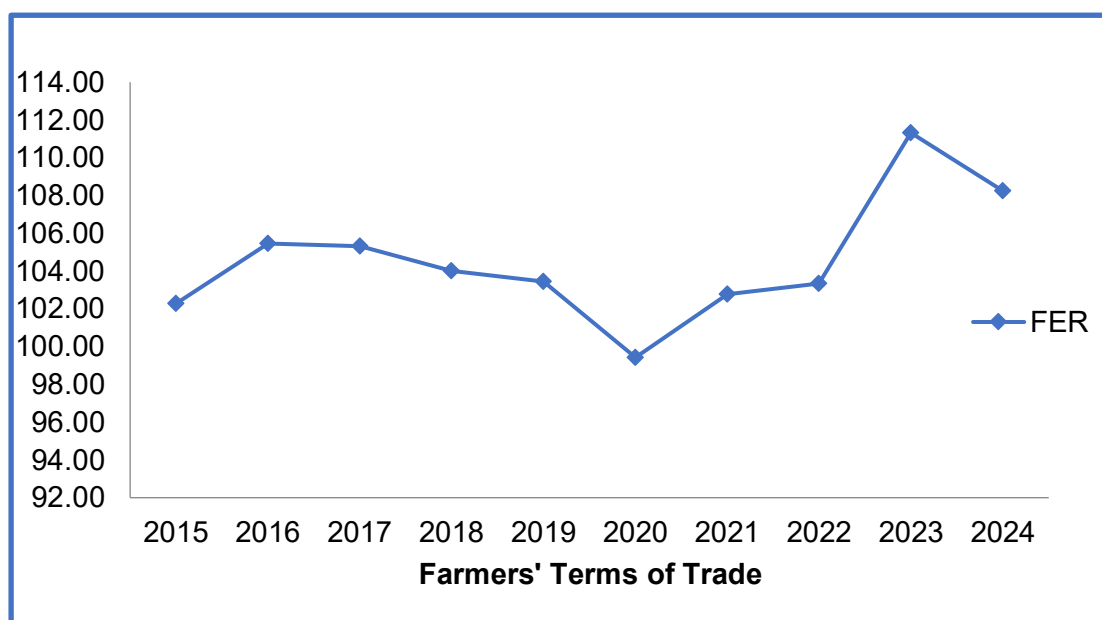
## RESULTS AND DISCUSSION

### Description of the Farmers' Terms of Trade (NTP) in Gorontalo Province

The Farmers' Terms of Trade (NTP) is a unique indicator of farmer welfare. It has been developed as a measure of farmers' purchasing power and their ability to meet household expenses. One key aspect of farmer welfare is the capacity of farming income to support basic household needs. The higher the purchasing power of a farmer's income relative to consumption needs, the higher the NTP, which indicates greater relative prosperity for farmers (Ramadhanu et al., 2021). However, while the NTP in Gorontalo Province has experienced increases over time, these improvements have not yet been sufficient to demonstrate a consistent reduction in poverty.

Figure 1 shows that the NTP rose from 102.28 in 2015 to 105.47 in 2016, reflecting relatively pro-agricultural government policies, such as fertilizer subsidies and irrigation infrastructure development. A study by Fujie et al. (2005) confirms that the expansion of micro-irrigation systems enhances farmers' productivity and strengthens their terms of trade in relation to production inputs. However, from 2017 to 2020, the trend showed a decline, reaching a low point in 2020 when the NTP dropped to 99.43, falling below the break-even benchmark of 100. This decline was strongly associated with the impact of the COVID-19 pandemic on supply chains, agricultural product distribution, and input prices (Mahmood et al., 2024). The year 2020 marked a critical point, as the pandemic disrupted agricultural supply chains and product distribution (Darwis et al., 2020). This was further exacerbated by decreased consumer

purchasing power and falling commodity prices (Workie et al., 2020). The observed decline in NTP from 2017 to 2020 occurred despite the continued implementation of fertilizer subsidy programs primarily covering urea, NPK, and organic inputs and ongoing irrigation development, including the rehabilitation of irrigation networks and improvement of water management systems.



**Figure 1.** Average Farmers' Terms of Trade (NTP) in Gorontalo Province, 2015–2024

This trend suggests that NTP dynamics are not solely determined by policy support, but are also influenced by broader structural factors such as declining agricultural commodity prices, increasing input costs, climate variability affecting production cycles, and inefficiencies in distribution and market access. These conditions had already exerted downward pressure prior to 2020, with the COVID-19 pandemic further amplifying the contraction through disruptions in supply chains and demand. In line with national economic recovery efforts, the NTP began to rebound from 2021 to 2023, driven by commodity price recovery and improved subsidy policies for agricultural inputs (Indrawati et al., 2024). However, in 2024, a slight correction occurred, with NTP falling to 108.25, likely due to rising fuel and fertilizer prices (Safrida et al., 2024).

Increases in fertilizer and fuel prices significantly affect the input price index paid by farmers, thereby potentially lowering the NTP (Saruksuk, 2025). Market price fluctuations for agricultural products heavily influence farmers' incomes. The price of rice and horticultural crops have dominant effects (Perangin-angin & Sibuea, 2025). Subsidy programs, food distribution schemes, and export incentives play critical roles in maintaining NTP stability (Heriyadi et al., 2024). In addition, domestic inflation and the depreciation of the rupiah against

the US dollar have influenced the pricing of agricultural inputs and outputs (Harizahayu et al., 2023). Climate change, which alters planting patterns, is also a key variable in NTP trends (Balasha et al., 2023; Wakweya, 2025). According to Yasin & Amin (2021) and Iuga et al. (2024), the post-pandemic upward trend in NTP reflects the effectiveness of recovery programs, yet recent declines serve as a warning sign of increasing production costs. Therefore, long-term strategies such as commodity diversification, empowering women farmers, and improving farmers' access to technology and markets are essential to ensure stable and positive NTP trends (Awoyemi et al., 2023; Juswadi & Sumarna, 2024; Talakua et al., 2025).

An analysis of the NTP in Gorontalo Province from 2015 to 2024 reveals a striking paradox in the relationship between farmer welfare and poverty. Although the NTP consistently exceeded 100%, indicating positive terms of trade for farmers, poverty levels particularly in rural areas remain substantially high. Over this period, poverty has shown only a gradual decline, with rural poverty reaching 22.97% in 2024, significantly higher than urban poverty at 4.99%, contributing to an overall provincial rate of 13.87%. Given that rural areas are predominantly characterized by agricultural livelihoods, this disparity implies that the agricultural sector remains the largest contributor to poverty compared to non-agricultural (urban) sectors. This reflects the complex dynamics between farmer welfare and poverty in Gorontalo Province. In reality, while a high NTP should indicate improved farmer welfare, many farmers in the province still live below the poverty line. This is because agriculture is highly vulnerable to external shocks such as commodity price fluctuations and climate variability, which lead to unstable farm incomes. In certain years, the NTP may be relatively high, but in others, income can plummet sharply due to these external factors. Such unpredictability complicates farmers' efforts to plan and manage their finances effectively.

A deeper analysis, based on qualitative findings from in-depth interviews with key stakeholders including financial institutions involved in agricultural credit appraisal suggests that the ideal NTP value should range between 120% and 130%. This benchmark reflects practical considerations of farmers' repayment capacity, production sustainability, and minimum welfare thresholds derived from field-based assessments rather than solely from secondary statistical indicators. This concept is based on the assumption that if an individual wishes to apply for credit or take out a loan, at least 30% of their total income should be allocated to cover basic living expenses. This implies that NTP must be considerably higher than the break-even point of 100% to reflect actual economic well-being. Farmers often face numerous obstacles in improving their livelihoods, including limited capital, low levels of education and skills, and weak bargaining positions in the market (Wanimbo, 2019). Siebrecht (2020) emphasizes that the support provided to farmers should include agricultural production

inputs such as high-quality seeds, fertilizers, pesticides, and labor costs, particularly to pay workers who perform tasks that the farmers themselves are unable to carry out.

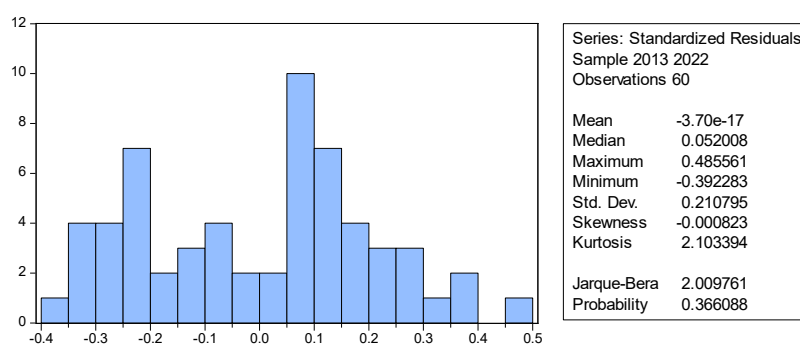
Although the calculated NTP shows an upward trend, indicating potential improvements in farmer welfare, field realities reveal that agriculture remains the largest contributor to poverty in Gorontalo Province. This paradox is largely due to the dominance of tenant farmers, over 40% of the farming population in the province consists of landless sharecroppers. Additionally, many farming households have a high dependency ratio, with the average farmer supporting more than three children. Most critically, the NTP often fails to fully reflect the actual living conditions and economic well-being of farmers on the ground. This gap between NTP figures and real-world welfare outcomes aligns with the arguments of Salahuddin et al. (2023) and Farida et al. (2024), who contend that the NTP calculation, based on a fixed quantity index (Laspeyres Index), does not comprehensively represent farmer welfare. An increase in the prices received by farmers does not necessarily equate to increased income. In fact, rising output prices may signal a shortage in agricultural supply or production. Furthermore, the NTP metric does not account for productivity improvements, technological advancement, or rural development progress.

### **Farmers' Terms of Trade (NTP) as a Mediator of Fiscal Policy in Reducing Poverty**

Effective fiscal policy, particularly the optimization of General Allocation Funds (DAU) and Special Allocation Funds (DAK) directed toward agricultural development, can enhance farmers' productivity and income. As a result, the Farmers' Terms of Trade (NTP) may improve, ultimately contributing to a reduction in poverty levels. Based on this rationale, NTP is examined in this study as a mediating variable in the relationship between fiscal policy and poverty alleviation.

#### **1. Prerequisites for Analysis**

The data analysis in this study employs path analysis. Therefore, the only prerequisite test conducted prior to the main analysis is the normality test.



**Figure 2. Normality Test Results**

The Jarque-Bera test produced a calculated Z-value of 2.009, which is greater than the critical Z-table of 1.96. However, the probability value of the Jarque-Bera test is 0.366, which is greater than the significance level ( $\alpha = 0.05$ ). Therefore, it can be concluded that the data are normally distributed, meeting the assumption required for path analysis.

## 2. Results of the Inferential Analysis for Equation 1 and Equation 2

The results of the analysis on the effect of General Allocation Fund (DAU) and Special Allocation Fund (DAK) on the Farmers' Terms of Trade (NTP) are as follows:

**Table 1.** The Effect of DAU and DAK on NTP

Variables and Model Statistics	The Effect of DAU and DAK on NTP (Equation 1)		The Effect of NTP, DAU and DAK on Poverty (Equation 2)	
	t-Statistic	Prob.	t-Statistic	Prob.
Constant	-1.13E-10	1.0000	-6.72E-11	1.0000
NTP	-	-	-1.430947	0.1585
DAU	0.848693	0.3999	-3.679971	0.0006
DAK	2.247415	0.0289	-0.369202	0.7135
R <sup>2</sup> / Adj. R <sup>2</sup>	0.176637 / 0.065800		0.955566 / 0.948595	
F-Statistic (Prob.)	1.593665 (0.158115)		137.0947 (0.000000)	

Source: E-Views, 2025

### a. The Effect of General Allocation Fund (DAU) and Special Allocation Fund (DAK) on Farmers' Terms of Trade (NTP)

Table 1 shows that the General Allocation Fund (DAU) has a probability value of 0.3999, which is greater than the significance level of 5%. This indicates that DAU has a positive but not statistically significant effect on the Farmers' Terms of Trade (NTP) in Gorontalo Province. Further interpretation reveals that a 1% increase in DAU corresponds to a 0.053% increase in NTP. This implies that although increased DAU funding can stimulate economic growth in the agricultural sector, enhancing production and ultimately exerting a positive influence on NTP, the resulting effect is not yet optimal. This indicates that DAU has a positive but not statistically significant effect on the Farmers' Terms of Trade (NTP). In the context of Gorontalo Province, this result reflects the general nature of DAU, which is largely allocated to routine expenditures rather than directly supporting agricultural productivity. This finding contributes to the literature by highlighting the limited effectiveness of untargeted fiscal transfers in improving farmer welfare. The insignificant result suggests that external factors, such as input costs and market conditions, may weaken its impact, indicating the need for more targeted fiscal policies in future research. This is due to the complexity of the rural economic system, which involves numerous variables, including external factors that are difficult to quantify accurately, as well as suboptimal agricultural downstream policy support in Gorontalo Province. The increase in

DAU is identified as a catalyst for economic growth in the agricultural sector (Prasetyo & Aida, 2017; Ridho & Wijayanti, 2022). DAU provides resources that can be utilized to improve agricultural production, infrastructure, and other aspects that support the sector's sustainability (Sidiki et al., 2021). With greater access to funds, farmers have the potential to enhance production efficiency, adopt new technologies, and scale up their operations. As a result, increased production can have a positive impact on NTP (Akbar et al., 2019; Mantau et al., 2019).

In contrast, the Special Allocation Fund (DAK) has a probability value of 0.0289, which is less than the 5% significance level, indicating a positive and statistically significant effect on NTP in Gorontalo Province. Further analysis shows that a 1% increase in DAK can lead to a 0.095% increase in NTP. This means that DAK has demonstrated its role as a key driver of improvements in NTP, functioning not only as a source of funding but also as a strategic instrument for developing the agricultural sector, boosting productivity, and contributing positively to the agricultural economy, as reflected in the progressive increase in NTP. The Special Allocation Fund (DAK) shows a positive and statistically significant effect on the Farmers' Terms of Trade (NTP) in Gorontalo Province. This result reflects the targeted nature of DAK, which is specifically directed toward agricultural infrastructure, input support, and productivity-enhancing programs. In the local context, such allocations contribute more directly to improving farmers' production capacity and income. Theoretically, this finding confirms that targeted fiscal interventions are more effective than general transfers. DAK contributes not only financially but also acts as a strategic enabler for agricultural development in Gorontalo Province. The success of DAK can be attributed primarily to its targeted focus on infrastructure and agricultural development projects. DAK is specifically allocated to support the construction of rural roads, irrigation systems, agricultural distribution centers, and other essential facilities that are critical to the progress of the agricultural sector (Nuryadin & Suharsih, 2017; Prayona et al., 2019). Both DAU and DAK are fiscal policy instruments designed with the primary goal of enhancing community welfare, especially within the agricultural sector (Setiartiti, 2021).

#### ***b. The Effect of Farmers' Terms of Trade (NTP), General Allocation Fund (DAU), and Special Allocation Fund (DAK) on Poverty***

Table 1 shows that the Farmers' Terms of Trade (NTP) has a probability value of 0.1585, which is greater than the 5% significance level. This indicates that NTP has a negative but not statistically significant effect on poverty in Gorontalo Province. Further interpretation suggests that a 1% increase in NTP could reduce the poverty rate by 0.062%. NTP has a negative but not statistically significant effect on poverty in Gorontalo Province. This finding reflects field

conditions where increases in NTP do not necessarily translate into substantial income gains for farmers, as margins between output prices and production costs remain relatively small. In the local context, many farmers operate at subsistence levels, limiting the impact on poverty reduction. Theoretically, this highlights the limitation of NTP as a sole welfare indicator. This implies that NTP is an important instrument in poverty reduction, especially considering that a significant proportion of the poor population in Gorontalo works in the agricultural sector. However, the lack of statistical significance may be attributed to various factors, as discussed by Aulia et al. (2021), Udi & Rosyadi (2023), and Romiza & Nopiah (2024) such as commodity price fluctuations, climate uncertainty, and unfavorable economic policy changes. Moreover, while the NTP figure might exceed 100%, it may still fall short of being an ideal indicator, as it does not account for living costs and inflation affecting essential goods in rural farming communities.

Meanwhile, the General Allocation Fund (DAU) has a probability value of 0.0006, which is lower than the 5% significance level. This means that DAU has a negative and statistically significant effect on poverty in Gorontalo Province. A 1% increase in DAU is estimated to reduce the poverty rate by 0.145%. DAU has a negative and statistically significant effect on poverty in Gorontalo Province, indicating that higher fiscal transfers are associated with reductions in poverty levels. In the local context, this reflects the role of DAU in financing essential public services, social assistance, and basic infrastructure that indirectly improve living standards. This finding contributes to the literature by confirming the effectiveness of general fiscal transfers in alleviating poverty, even without direct sectoral targeting. Theoretically, it underscores the importance of redistribution mechanisms in regional development and poverty reduction. According to Adnan (2019), Kharisma et al. (2020), and Sembiring et al. (2024), this suggests that DAU has been effectively allocated to support rural infrastructure projects, expand access to education, and implement skills training programs, all of which directly influence the livelihood and welfare of farming communities. Moreover, DAU is also used to fund economic empowerment initiatives, such as providing business capital assistance for vulnerable groups, particularly farmers, thereby contributing significantly to poverty reduction.

In contrast, the Special Allocation Fund (DAK) shows a probability value of 0.7135, which is greater than the 5% significance level, indicating a negative but not statistically significant effect on poverty in Gorontalo Province. Further analysis suggests that a 1% increase in DAK may reduce poverty by 0.017%. The Special Allocation Fund (DAK) shows a negative but not statistically significant effect on poverty in Gorontalo Province. This suggests that although DAK is designed to support specific sectors, including agriculture, its impact on poverty reduction is not yet optimal in practice. In the local context, this may be due to implementation

inefficiencies, time lags in program outcomes, or limited coverage of beneficiary groups. This finding contributes by highlighting that targeted fiscal policies do not automatically translate into poverty reduction. Theoretically, it underscores the importance of effective program execution and targeting accuracy. This means that DAK has potential as an instrument for stimulating local economic growth, improving community welfare, and reducing poverty (Awaludin & Wibowo, 2023; Hilmawan et al., 2023). However, its impact remains limited, likely due to misalignment between DAK-funded projects and the actual needs and characteristics of the local economy. Many of these projects may not directly target the most vulnerable groups, especially subsistence farmers and agricultural laborers, who are most affected by poverty.

### 3. Indirect Effect Results

The indirect effects were further analyzed using Sobel analysis to obtain the Z-calculated value, which is then compared to the Z-table value of 1.96 at a significance level of  $\alpha = 0.05$ . The results of the Sobel analysis for the indirect effects are detailed below:

#### a. Mediating Effect of Farmers' Terms of Trade (NTP) on the Relationship Between General Allocation Fund (DAU) and Poverty

The analysis regarding the mediating effect of NTP on the influence of DAU on poverty shows the following:

$$Sab = \sqrt{b^2 \cdot Sa^2 + a^2 \cdot Sb^2 + Sa^2 \cdot Sb^2}$$

$$Sab = \sqrt{-0,063^2 \cdot 0,063^2 + 0,054^2 \cdot 0,044^2 + 0,063^2 \cdot 0,044^2}$$

$$Sab = \sqrt{0.0000158 + 0.0000055 + 0.0000077}$$

$$Sab = \sqrt{0.0000290}$$

$$Sab = 0.0053868$$

$$Z_{value} = \frac{ab}{Sab}$$

$$Z_{value} = \frac{-0,063 \times 0,054}{0.0053868}$$

$$Z_{value} = \frac{-0.003}{0.0053868}$$

$$Z_{value} = -0,626$$

$$Probability Z_{value} = 0,734$$

Based on the calculation, the  $Z_{\text{value}}$  for the DAU variable is -0.626. When compared to the  $Z_{\text{table}}$  value of 1.96, the calculated  $Z_{\text{value}}$  is significantly smaller. Moreover, the significance level of DAU is greater than the 5% alpha level, indicating that DAU, through NTP, has a negative but not statistically significant effect on poverty in Gorontalo Province. This insignificant negative effect implies that NTP has not yet served as an effective mediating variable in enhancing the influence of DAU on poverty. This result indicates that DAU, through NTP, has a negative but not statistically significant indirect effect on poverty in Gorontalo Province. In the local context, this reflects the limited capacity of NTP to transmit the benefits of general fiscal transfers into meaningful welfare improvements for farmers. Although DAU contributes to public spending, its indirect channel through NTP remains weak due to structural constraints such as low productivity and narrow income margins. This finding contributes theoretically by emphasizing that mediation effects require strong intermediate variables to effectively link fiscal policy and poverty reduction outcomes. This is because the current figures of NTP need further optimization. While NTP is already considered a potential representation of poverty reduction, it has not fully achieved this role, as many farmers' incomes remain below the established poverty line (Ibrahim et al., 2024). Other studies have shown that DAU will have a significant impact on regional economic and social development only when accompanied by equitable economic growth and increased productivity in the real sectors, such as agriculture (Harahap et al., 2021). Additionally, central government transfers like DAU are sometimes suboptimal in improving community welfare, as their impact may be hindered by high unemployment rates and inefficiencies in regional spending, especially when such spending fails to adequately target productive sectors like agriculture (Holik, 2020).

#### ***b. Mediating Effect of the Farmer's Terms of Trade (NTP) on the Influence of Special Allocation Fund (DAK) on Poverty***

The results regarding the mediating effect of the Farmer's Terms of Trade (NTP) on the influence of the Special Allocation Fund (DAK) on poverty are as follows:

$$Sab = \sqrt{b^2 \cdot Sa^2 + a^2 \cdot Sb^2 + Sa^2 \cdot Sb^2}$$

$$Sab = \sqrt{-0,063^2 \cdot 0,043^2 + 0,096^2 \cdot 0,044^2 + 0,043^2 \cdot 0,044^2}$$

$$Sab = \sqrt{0.0000072 + 0.0000177 + 0.0000035}$$

$$Sab = \sqrt{0.0000285}$$

$$Sab = 0.0053343$$

$$Z_{\text{value}} = \frac{ab}{Sab}$$

$$Z_{value} = \frac{-0,063 \times 0,096}{0.0053343}$$

$$Z_{value} = \frac{-0.006}{0.0053343}$$

$$Z_{value} = -1,130$$

$$Probability Z_{value} = 0,129$$

Based on the above calculation, the  $Z_{value}$  for the DAK variable is -1.130. When compared to the  $Z_{table}$  value of 1.96, the  $Z_{value}$  is significantly lower. Additionally, the significance value of DAK is higher than the 5% alpha level. Therefore, DAK, through NTP, has a negative but not statistically significant effect on poverty in Gorontalo Province. This insignificant negative result indicates that NTP has not been able to serve as an effective intervening variable in strengthening the influence of DAK on poverty. Although NTP may affect farmers' income, its impact in reducing poverty is limited. This is because poverty levels do not rely solely on income, but also on access to resources, education, and healthcare, factors that are not fully captured in NTP. This becomes even more critical when NTP figures do not account for inflation and living costs, especially when the agricultural land area is insufficient to generate income above the poverty line set by Statistics Indonesia (BPS) (Nugroho et al., 2021). This finding indicates that DAK, through NTP, has a negative but not statistically significant indirect effect on poverty in Gorontalo Province. In the local context, this reflects that improvements in NTP have not been sufficient to substantially reduce poverty, as many farmers operate on small landholdings with limited income gains. Additionally, welfare conditions are influenced by broader factors such as access to education, healthcare, and economic opportunities. This finding contributes theoretically by highlighting the limitation of NTP as a mediating variable and emphasizing the need for multidimensional approaches to poverty reduction. Furthermore, the effectiveness of DAK in the agricultural sector greatly depends on the precision of program targeting and synergy with food security policies. National-level analyses reveal that while DAK in agriculture can contribute to food security, its impact varies based on implementation quality and regional conditions (Meliala & Djameluddin, 2024). Junaidi (2022) argues that land allocation also affects production structures and income distribution in agriculture. To optimize this, a significant portion of DAK should be allocated to agricultural infrastructure, such as irrigation (Balasubramanya & Stifel, 2020).

Although NTP is an important indicator, it does not encompass all dimensions of farmers' welfare in Gorontalo. Factors such as cost of living, availability of natural resources, and access to markets are not fully reflected by NTP. The role of the government and fiscal policies becomes crucial in re-evaluating economic policies that support agriculture, restructuring budget allocations, and deepening the understanding of local dynamics to improve the

effectiveness of DAU and DAK. Increasing investment in projects that directly impact agricultural productivity, rural economic diversification, and market access for farmers can help improve the relationship between DAU, DAK, and NTP. Developing policies that support sustainable agriculture, economically, socially, and ecologically, can establish a stronger foundation for poverty reduction. Wijaya et al. (2021) stress the importance of sustainable agriculture, which ensures that the commodities farmed continue to provide consistent benefits to household economies and help reduce poverty. Support for environmentally friendly farming practices, innovation in agricultural technology, and farmer empowerment through skill development can be long-term strategies to enhance the sector's contribution to both farmer welfare and poverty alleviation. A major issue is that many farmers in Gorontalo Province are smallholders or "petani gurem", with land ownership of less than 0.5 hectares. As a result, agricultural production remains insufficient to meet household needs, even though farming revenues may exceed operating costs.

Local fiscal budgets or policies allocated to the agricultural sector play a vital role in poverty reduction, especially in rural areas that depend heavily on agricultural activities. Fiscal support has been shown to contribute to rural poverty reduction by improving infrastructure and access to basic services Sinarwati & Sihombing (2024), while government spending focused on agriculture can improve household welfare by enhancing productivity and farmers' incomes (Adebayo, 2025; Anderson et al., 2018; Jung et al., 2015). Labor mobility and land access significantly influence poverty dynamics and the welfare of farming households (Moeis et al., 2020), and land size and irrigation access are critical thresholds for the effectiveness of agricultural intensification in reducing poverty (Urfels et al., 2023). Additionally, agricultural productivity, food prices, and exchange rate policies all play complex roles in the welfare of the poor (Alemu, 2022; Huang et al., 2023). Output price support and capability-based policies can help smallholder farmers escape long-term poverty (Abokyi et al., 2020; Eichsteller et al., 2022), and structural transformation in agriculture is seen as a key pathway for poverty reduction (Balasubramanya & Stifel, 2020; Christiaensen & Martin, 2018). Thus, government intervention in the agricultural sector through productive fiscal allocations will ultimately enhance NTP and farmers' welfare, leading to a reduction in poverty, particularly among farming communities.

## CONCLUSION

The progress of the Farmer's Terms of Trade (NTP) in Gorontalo Province tends to remain above 100%, indicating that farmers generally gain a profit from their agricultural activities. However, this figure does not fully represent the welfare of farmers. This is because the surplus (profit/income) between farming revenue and farming costs often still falls below the

poverty line, leading to a phenomenon where a high NTP coexists with persistent and significant poverty. Based on the path analysis results: (a) The General Allocation Fund (DAU) has a positive but not significant effect on the Farmer's Terms of Trade (NTP) in Gorontalo Province; (b) The Special Allocation Fund (DAK) also shows a positive but not significant effect on NTP. A 1% increase in DAK provides only a limited positive impact on NTP; (c) NTP has a negative but not significant effect on poverty levels in Gorontalo; (d) DAU has a negative but not significant effect on poverty in the province; (e) DAK also has a negative but not significant effect on poverty levels; (f) The indirect effect of DAU through NTP on poverty is also negative and not significant; (g) The indirect effect of DAK through NTP on poverty is negative and not significant.

The predominantly insignificant results suggest that the transmission of fiscal policy to farmer welfare and poverty reduction in Gorontalo Province is constrained by structural and contextual factors. These include the general allocation nature of DAU, implementation inefficiencies in DAK programs, limited agricultural productivity, small landholdings, and external pressures such as input price volatility and market instability. Consequently, fiscal interventions have not been sufficiently strong to produce measurable impacts. This finding contributes by highlighting the limits of fiscal effectiveness in the absence of structural support. Future research should incorporate institutional quality, market access, and productivity variables.

Based on the findings, it is recommended that the Regional Development Planning Agency (BAPPEDA) of Gorontalo Province strengthens fiscal policies that are more progressive and targeted toward improving farmers' welfare. This includes revisiting budget allocations to ensure that poverty reduction funds effectively reach the most vulnerable farming communities and enhancing monitoring and evaluation mechanisms to identify key success factors and challenges in improving the Farmer's Terms of Trade (NTP). The Provincial Agriculture Office should align agricultural development programs with the objective of increasing NTP by investing in infrastructure, farmer training, and technology adoption while improving inter-agency coordination to ensure coherence with broader poverty alleviation efforts. The Ministry of Agriculture is expected to design more focused decentralization programs by allocating resources to infrastructure, extension services, and skills development that directly enhance farmers' productivity and incomes. Agricultural extension officers must play an active role in mentoring farmers to make the most of these programs, particularly by encouraging diversification, improved farm management, and technology use tailored to local needs. Finally, farming communities themselves are encouraged to actively participate in training, organize through farmer groups or cooperatives, and work collectively to enhance their

bargaining position, which will help them better access and benefit from agricultural fiscal policies aimed at reducing poverty.

## CONFLICT OF INTEREST STATEMENT

The author declares no known conflicts of interest.

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