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Rice Import Policy: Assessing the Income of Farmers from Agriculture in Indonesia

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The amelioration of farmers' well-being constitutes a pivotal concern on a global scale, necessitating the conscientious attention of seasoned regulatory authorities and recent scholarly investigations. This article thus delves into an examination of the ramifications of rice import policies, encompassing facets such as rice importation, domestic rice production, and international trade, with a particular focus on their influence on the income of farmers in Indonesia. To discern patterns and interdependencies, the study incorporates population and economic growth as control variables for predicting farmers' income. Employing secondary data extracted from the World Development Indicators (WDI) and Statista spanning the years 1991-2022, the article adopts the dynamic autoregressive distributed lag (DARDL) approach to scrutinize the relationships among the aforementioned variables. The empirical findings illuminate a negative correlation between rice imports and farmers' income, signifying a potentially adverse impact. Conversely, rice production, international trade, population, and economic growth exhibit positive associations with farmers' income in the Indonesian context. These outcomes furnish valuable insights for regulatory bodies, guiding them in formulating policies geared towards augmenting farmers' income. Such initiatives may encompass the implementation of constraints on rice imports, alongside endeavours to enhance domestic rice production and facilitate international trade.

Keywords: Rice Import, Rice Production, International Trade, Population Growth, Farmers' Income, Economic Growth.

1. Introduction

Farmers' income constitutes the monetary proceeds derived from agricultural endeavours, serving as the financial resources available to farmers for practical applications. The determination of farmers' income is susceptible to a myriad of challenges, including unpredictable weather conditions, alterations in policies, fluctuations in regulations, shifts in the pricing dynamics of agricultural outputs, and escalations in agricultural costs. These multifaceted factors collectively exert influence on the overall revenue generated from farming activities (Ceballos et al., 2020). Examining the magnitudes of farmers' income is imperative, with a heightened emphasis on ensuring its stability, which constitutes a pivotal determinant for the effective operation of agricultural enterprises. The oscillations in farmers' income wield a profound influence on pivotal aspects such as agricultural decision-making, farming strategies, and the overarching capacity of agricultural businesses to engender sustainability in their operational endeavours across successive years (Noack & Larsen, 2019). The variability inherent in farmers' incomes poses a significant challenge to agricultural administration and the formulation of public policies. Attaining heightened stability in farmers' income, notwithstanding diverse contextual factors, holds the potential to enhance the financial resilience of farmers and redirect their focus towards agricultural development. Consequently, the cultivation of sustainability in agricultural practices and outputs ensues. This resultant agricultural sustainability contributes to the uninterrupted provision of food for living organisms, fosters biodiversity and environmental preservation, and furnishes essential resources and raw materials for economic processes (Baiyegunhi et al., 2019).

Farmers' income and agricultural growth are intricately interconnected, exerting mutual influence on each other. Consequently, policies devised to govern agriculture and foster agricultural growth, encompassing facets such as rice importation, rice production, and international trade, possess the potential to significantly impact and sustain farmers' income. The rice import policy, elucidating the feasibility of meeting domestic rice requirements through foreign procurement, is instrumental in addressing food scarcity concerns. However, it simultaneously engenders implications for farmers' rights. The substantial influx of imported rice diminishes the demand for domestically cultivated rice, thereby diminishing overall agricultural revenues. This, in turn, results in a concomitant reduction in farmers' income (Anang et al., 2020). Rice production entails the cultivation and processing of rice to render it in an edible form. The augmentation of rice production facilitates farmers in offering a more substantial rice supply to both national and international markets. This not only satisfies the domestic and global demand for rice but also yields substantial profits. The resultant agricultural revenues derived from the sale of rice serve to augment farmers' income (Anang & Yeboah, 2019). International trade denotes the execution of commercial activities on a global scale, encompassing the import and export of specific commodities. The involvement of agricultural enterprises in international trade serves to amplify agricultural production and enhance marketing efforts, consequently fostering an upswing in farmers' income (Chuang, 2019).

The present investigation directs attention towards the impact of rice import, rice production, and international trade on the income of farmers in Indonesia. Indonesia boasts a substantial

expanse of agricultural land, with nearly 30% of its total area dedicated to agricultural activities, engaging millions of farmers in income-generating endeavours. The agricultural sector, contributing to 13.7% of the Indonesian economy, holds considerable significance. Reflecting the magnitude of agricultural engagement, the population of Indonesia reached 275,501,339 in 2022, with the agricultural sector furnishing employment opportunities for 28.99% of the populace. Noteworthy data from February 2022 indicates that 40.64 million farmers were actively engaged in agricultural pursuits. Undoubtedly, farmers serve as the linchpin of agriculture, assuming a pivotal role despite encountering numerous challenges in crop cultivation, often remunerated with meagre wages (Ma et al., 2019). As of January 2022, the daily average income was reported at 52.54 thousand rupiah, a sum deemed insufficient for the livelihoods of small farmer families, who constitute 93% of the overall farming demographic. Their meagre earnings fall notably short of meeting the demands associated with their occupation. Notwithstanding Indonesia's commendable production of diverse agricultural commodities, including palm oil, coffee, tea, spices, cassava, and natural rubber, it is particularly renowned for its paddy rice production, serving as the staple food in the Indonesian context. Indonesia's prowess in rice production has earned it a position among the top three global rice producers, and it holds the 64th rank in terms of rice exports. In the year 2021, Indonesia's total rice export amounted to $4.13 million (Desmiwati et al., 2021). Indonesia engages in rice trade with several nations, with its primary rice export destinations including Angola, the Philippines, France, Brunei, and Senegal. Conversely, Indonesia sources rice imports from India, Singapore, Malaysia, Vietnam, and Thailand. In the current year, the nation has imported 1.59 million tons of rice, catering to both immediate consumption and future reserves. The country specializes in cultivating diverse rice varieties, such as Rojo Lele, Pandan Wangi, Manthik, Beras merah, Satra romos, Cianjur, sticky long-grain rice, jasmine rice, among others, contributing to a rich mosaic of 7,000 rice varieties. In 2018, Indonesia achieved a noteworthy rice production output of 83.0 million tons, utilizing an expansive land area of 10 million hectares for rice cultivation (Ariyadi, 2021).

While the Indonesian agricultural sector is burgeoning and significantly contributing to economic growth, the overall well-being of farmers remains a key determinant for agricultural development. This study, centred on farmers' income, addresses the specific needs of the Indonesian agricultural landscape. The primary aim of this investigation is to assess the influence of rice import, rice production, and international trade, alongside economic and population growth as control factors, on farmers' income.

This current research offers valuable insights for academics due to its distinctive literary contributions. Notably, it distinguishes itself from prior studies wherein authors separately investigated the influence of rice import and international trade on farmers' income; in contrast, this study concurrently assesses the combined effects of both factors. Moreover, prior research has predominantly focused on either agricultural production or trade individually as determinants of farmer income, whereas this study significantly enriches the literature by examining the roles of rice import, rice production, and international trade in farmers' income. Thirdly, this study takes a pioneering approach by scrutinizing the interplay between rice import, rice production, international trade, economic growth, population growth, and farmers' income in the context of Indonesia.

The research comprises five integral sections, with the second segment dedicated to a comprehensive review of pertinent literature pertaining to the interrelated aspects under consideration. The third section delineates the research methodology employed in the study. Subsequently, the fourth segment presents the findings, substantiated by a synthesis with relevant prior studies. The final section encapsulates the implications drawn, conclusions reached, and acknowledges the inherent limitations of the study.

2. Literature Review

The income of farmers is contingent upon both agricultural production and trade, thereby rendering it susceptible to the influences of rice import, rice production, international trade, economic growth, and population growth. Various scholars have explored the dynamics of these interrelations with farmers' income, each offering distinct perspectives. The subsequent paragraphs provide a comprehensive review of the literature to scrutinize the nuanced connections between rice import, rice production, international trade, economic growth, population growth, and farmers' income.

Within the realm of rice importation, the fulfilment of domestic rice requirements, and more broadly, food consumption needs, is achieved through the procurement of rice from international sources. In a scenario where there exists a proclivity among the populace for foreign rice products, leading to a preference for rice imports over domestically cultivated varieties, a surge in demand for imported rice ensues. This phenomenon induces a detrimental impact on domestic farmers, who experience a concomitant reduction in the sale of domestically produced rice, thereby diminishing their overall income (Yusuf et al., 2020). Qian et al. (2020) conducted a study using a partial equilibrium model to examine the impact of rice import on food security and farmer income in China. Utilizing national annual time series data since 1990, the research contends that in a country where the importation of agricultural food products is permitted, and there is a proclivity to purchase rice from foreign agricultural systems, the monetary benefits accrue to foreign farmers. Consequently, farmers in the domestic agricultural system reduce rice production to meet diminished demand, resulting in lower incomes and reduced profits from sales. Ojo and Baiyegunhi (2020), the examination of the correlation between rice importation and farmer income is undertaken, employing the Switching Regression Model (ESRM) to scrutinize this nexus within the context of South-West Nigeria. The study posits that the enactment of an agricultural import policy, specifically for rice, results in the satisfaction of domestic rice consumption demands through the acquisition of rice products from foreign nations. Subsequently, the demand for domestically cultivated agricultural products diminishes, leading to a decline in farmers' profits from sales. Consequently, the escalation in rice imports is associated with a reduction in farmers' income.

The cultivation of rice holds significant importance as a primary food source. When farmers demonstrate a committed focus on the production of agricultural commodities, such as rice, they actively contribute to the national food supply, subsequently augmenting their overall sales. The consequential escalation in total agricultural sales not only contributes substantially to the income derived from agricultural activities but also serves as an incremental addition to the regular income of farmers. Consequently, the augmentation in rice production within the agricultural sector is directly associated with an increase in farmers' income (Ghosh et al., 2021). Emran et al. (2021) focus of this research centres on the impact of rice production on farmers' income. Data for the study were procured through a panel survey dataset encompassing 32 variables, gathered from 502 farm households situated in coastal Bangladesh spanning the years 2005 to 2015. The investigation posits that the augmentation in rice production within the agricultural sector, coupled with the processing of rice through rice plants, amplifies the overall rice supply originating from the agricultural domain. Following the fulfilment of domestic food requirements, surplus supplies become available for presentation in the international market. Consequently, revenue accrues from both national and international markets, resulting in a discernible increase in farmers' income. Tanjung (2020) examines the impact of rice production on farmers' income using data collected through questionnaires and interviews from rice farmers in Labuhan Batu District. Utilizing the SWOT analysis method, the study asserts that enhanced agricultural production leads to increased sales and greater profits. Efficiency in rice production enables agricultural firms to meet customer demands, resulting in planned earnings from rice sales. The augmented agricultural earnings consequently contribute to an increase in farmers' income.

A trade policy supporting international trade offers numerous economic advantages. Whether in the form of imports or exports, international trade creates opportunities for economic growth and raises incomes for producers and laborers. In the agricultural sector, importing resources, raw materials, or technologies facilitates agriculture, while exports contribute to increased sales. Consequently, international trade enhances the domestic agriculture system and augments agricultural revenues, thereby increasing incomes for farmers engaged in agricultural services (Assagaf et al., 2020). Werner et al. (2019) assess the impact of international trade on farmers' income in the Dominican Republic and Central America. The research data were derived from a case study analysing the implementation of the Dominican Republic-Central America Free Trade Agreement (CAFTA-DR) spanning from 1990 onward. The study posits that active engagement in international trade empowers a country to import cutting-edge agricultural technologies. The incorporation of innovative technologies contributes to agricultural growth, enabling the generation of higher revenues for farmers. Banik et al. (2019) examine the interplay between international trade, innovative strategies, and farmers' income. The study suggests that when a country's government formulates a trade policy to foster international trade and grants agricultural firms the capacity to engage in such trade, along with the ability to import agricultural resources and technologies, these firms, equipped with modern resources and technologies, can execute innovative strategies that yield remarkable results in agricultural production. This, in turn, translates into heightened marketing opportunities for agricultural products. Consequently, the resulting larger sales generate greater profits, thereby affording farmers a higher consumable income.

Within an expanding economy, various economic sectors witness strengthened financial positions over time, enabling them to embrace innovative resources. Analogously, the agricultural sector, amidst this economic growth, fortifies its financial standing and incorporates innovation into its practices. The adoption of innovative technologies serves to address numerous agricultural challenges, enhance processes, and elevate the production of high-quality agricultural goods. This amplification and value addition to the agricultural domain result in augmented agricultural revenues and a subsequent increase in farmers' incomes (Brookes & Barfoot, 2020). Hemming et al. (2018) delves into the examination of the influence of economic growth on farmer income. The study constitutes a review encompassing 16 studies utilizing computable models and 15 experimental and quasi-experimental studies, primarily concentrated in sub-Saharan Africa. The findings underscore that a robustly growing economy garners a favourable reputation in the international market, thereby enticing foreign entities to engage in commercial dealings within the country. This, in turn, fosters foreign investment and administration. Such developments collectively mitigate financial challenges, enhance operational efficiency, and augment the value of production across diverse economic sectors, including agriculture. The resultant growth in the agriculture sector not only amplifies agricultural revenues but also culminates in an upswing in farmers' income. Yaqoob et al. (2023) investigates the correlation between economic growth and farmers' income. Employing a three-state panel analysis with a sample comprising India, Pakistan, and Bangladesh, the study utilizes panel data spanning from 1973 to 2020. Farm input data is analysed using an autoregressive distributed lag model with a pooled mean group (ARDL PMG) approach, recognized for its highly dynamic modelling capabilities with heterogeneous data. The study underscores that elevated economic growth fosters enhanced relationships between the agricultural sector and foreign investors and businesses within the country. In such contexts, agricultural practices witness improvement, and the marketing of agricultural products experiences an upsurge, successfully meeting customer requirements. The resultant increase in agricultural marketing leads to greater revenues, thereby affording farmers higher incomes.

Population growth serves as a determinant of the resident population within a given region, and this burgeoning populace necessitates access to fundamental life necessities for sustenance. The escalation in population, attributed to heightened population growth rates, induces an augmented demand for essential goods such as food, energy resources, clothing, and the like. The agricultural sector, being a primary source of finished goods or raw

materials for various economic domains, is compelled to intensify its operations and elevate production levels. The ensuing agricultural marketing activities not only result in an overall increase in revenues for the designated period but also contribute to an augmentation of farmers' incomes (Akbari et al., 2020). Maja and Ayano (2021) examines the impact of population growth on farmers' income within low-income developing countries. Elevated population growth prompts an increased demand for essential commodities, particularly food products and other fundamental necessities. Given that a significant portion of these essential goods is derived from agriculture or agro-based enterprises, there arises a heightened need for agricultural products, necessitating an increase in agricultural production. The expansion of agricultural practices to meet market demands not only enhances the sources of revenue but also results in an upward trajectory of farmers' income levels. Giller et al. (2021) investigates the influence of population growth on farmers' income within distinct farming systems in Mali, Ethiopia, Ghana, Tanzania, Malawi, and Uganda. Regions with substantial population concentrations draw government attention during the formulation of developmental initiatives. In such regions, agricultural growth and the well-being of farmers become focal points of concern. Consequently, the introduction of modern agricultural tools and the establishment of new marketing channels for agricultural products ensue. This strategic approach facilitates financial development within the agricultural sector, potentially resulting in increased incomes for farmers.

3. Research Methods

The study delves into an analysis of the effects of rice import, rice production, international trade, population, and economic growth on farmers' income in Indonesia. Control variables, such as population and economic growth, are incorporated to forecast farmers' income. Secondary data, extracted from 1991-2022, is obtained using the Statista&WDI. The study equation is presented below:

$$FI_t = \alpha_0 + \beta_1 RI_t + \beta_2 RP_t + \beta_3 IT_{it} + \beta_4 EG_t + \beta_5 PG_t + e_t \quad \textbf{(1)}$$

Where

t = Time Period
FI = Farmers Income
RI = Rice Import
RP = Rice Production
IT = International Trade
PG = Population Growth
EG = Economic Growth

The investigation employed farmers' income as the dependent variable, gauged through the annual percentage growth of agricultural, forestry, and fishing value added. Additionally, a solitary predictor, rice import policies, was utilized, quantified by the import volume of rice (million metric tons), rice production (million metric tons), and trade (% of GDP). Two control variables, economic growth (measured by GDP growth in annual percentage) and population growth (measured as annual percentage population growth), were incorporated. The detailed measurements are presented in Table 1.

Table 1: Variables and Measurements.

S#	Variables	Measurement	Sources
01	Farmers Income	Agricultural, forestry and fishing, value added (annual % growth)	WDI
02	Rice Import	Import volume of rice (million metric ton)	Statista
03	Rice Production	Rice production (million metric ton)	Statista
04	International Trade	Trade (% of GDP)	WDI
05	Population Growth	Population growth (annual %)	WDI
06	Economic Growth	GDP growth (annual percentage)	WDI

The investigation thoroughly examines the characteristics of the constructs through the application of descriptive statistics. Moreover, it investigates the interrelationships among the constructs by employing a correlation matrix. Additionally, the study conducts unit root analysis using both the ADF & PP tests. The corresponding equation is provided below:

$$d(Y_t) = \alpha_0 + \beta t + YY_{t-1} + d(Y_t(-1)) + \varepsilon_t \quad \textbf{(2)}$$

Moreover, the research explores co-integration using the methodology proposed by Westerlund and Edgerton (2008b) and the pertinent equations are presented below:

$$\mathrm{LM}_{\varphi}(\mathrm{i}) = \mathrm{T}\widehat{\varphi}_{\mathrm{i}}\,(\hat{\mathrm{r}}_{\mathrm{i}}/\widehat{\sigma}_{\mathrm{i}}) \quad \textbf{(3)}$$

$$\mathrm{LM}_{\tau}(\mathrm{i}) = \widehat{\varphi}_{\mathrm{i}}/\mathrm{SE}(\widehat{\varphi}_{\mathrm{i}}) \quad \textbf{(4)}$$

Furthermore, the researchers employed the ARDL approach to examine the interconnections between the constructs. This model is deemed effective as it offers insights into both short and long-term relationships (Nazir et al., 2018). Additionally, its utilization is justified as it addresses various concerns, including heteroscedasticity and autocorrelation, within the outcomes (Zaidi & Saidi, 2018). The equation of estimation is articulated as follows:

$$\Delta FI_t = \alpha_0 + \sum\delta_1 \Delta FI_{t-1} + \sum\delta_2 \Delta RI_{t-1} + \sum\delta_3 \Delta RP_{t-1} + \sum\delta_4 \Delta IT_{t-1} + \sum\delta_5 \Delta EG_{t-1} + \sum\delta_6 \Delta PG_{t-1} + \varphi_1 FI_{t-1} + \varphi_2 RI_{t-1} + \varphi_3 RP_{t-1} + \varphi_4 IT_{t-1} + \varphi_5 EG_{t-1} + \varphi_6 PG_{t-1} + \varepsilon_t \quad \textbf{(5)}$$

Furthermore, the study employed the DARDL approach to examine the associations among the variables. This method, introduced by Jordan and Philips (2018) addresses the limitations present in the conventional ARDL model. The respective equation is provided below:

$$\Delta FI_t = \alpha_0 + \sum\delta_1 \Delta FI_{t-1} + \sum\delta_2 \Delta RI_t + \sum\delta_3 \Delta RI_{t-1} + \sum\delta_4 \Delta RP_t + \sum\delta_5 \Delta RP_{t-1} + \sum\delta_6 \Delta IT_t + \sum\delta_7 \Delta IT_{t-1} + \sum\delta_8 \Delta EG_t + \sum\delta_9 \Delta EG_{t-1} + \sum\delta_{10} \Delta PG_t + \sum\delta_{11} \Delta PG_{t-1} + \varepsilon_t \quad \textbf{(6)}$$

4. Research Findings

The study examines the particulars of the constructs through descriptive statistics. The findings indicate that the mean value of FI is 3.048, RI is 1.380, and RP is 67.020. Additionally, the results also reveal the average values of IT, EG, and PG as 52.825, 4.621, and 1.293, respectively. These results are presented in Table 2.

Table 2: Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
FI	32	3.048	1.512	-1.332	6.894
RI	32	1.380	0.745	0.239	2.995
RP	32	67.020	5.258	52.81	71.093
IT	32	52.825	12.108	32.972	96.186
EG	32	4.621	3.750	-13.127	8.220
PG	32	1.293	0.287	0.637	1.742

Furthermore, the study examines the correlation among constructs using a correlation matrix. The findings indicate a negative association between rice import and farmers' income, whereas rice production, international trade population, and economic growth exhibit a positive association with farmers' income in Indonesia. These results are detailed in Table 3.

Table 3: Correlation Matrix.

Variables	FI	RI	RP	IT	EG	PG
FI	1.000					
RI	-0.042	1.000				
RP	0.024	-0.959	1.000			
IT	0.371	-0.630	0.612	1.000		
EG	0.554	-0.108	0.113	-0.493	1.000	
PG	0.127	-0.972	0.904	0.582	0.070	1.000

Additionally, the study conducts unit root analysis employing the ADF & PP tests. The results indicate that FI, RI, EG, and PG are stationary at the level, while RP and IT are stationary at the first difference. These findings are presented in Table 4.

Table 4: Unit Root Test.

	ADF PP			
Series	Level	First difference	Level	First difference
FI	-2.763***	------	-2.101***	------
RI	-2.195***	-----	-2.633***	------
RP	------	-4.382***	------	-5.372***
IT	------	-4.378***	------	-5.009***
EG	-2.091***	------	-3.281***	------
PG	-2.353***	------	-2.171***	------

Additionally, the study explores co-integration using the approach proposed by Westerlund and Edgerton (2008a). The results demonstrate that the p-values are below 0.05, and the t-values exceed 1.96, indicating the presence of co-integration. These findings are presented in Table 5.

Table 5: Co-integration Test.

Model	No Shift		Mean Shift		Regime Shift	
	Test Stat	p-value	Test Stat	p-value	Test Stat	p-value
LM_{τ}	-3.191	0.004	-3.101	0.007	-4.392	0.000
LM_{φ}	-3.872	0.000	-3.981	0.000	-4.399	0.000

The study also employed the DARDL approach to examine the associations among the variables. The findings indicate that rice import exhibits a negative association with farmers' income, while rice production, international trade, population, and economic growth display a positive association with farmers' income in Indonesia. These outcomes are detailed in Table 6.

Table 6: Dynamic ARDL Model.

Variable	Coefficient	t-Statistic	Prob.
ECT	2.101***	5.984	0.000
RI_{t-1}	-1.784**	-2.002	0.044
RI	-0.647***	-4.372	0.000
RP_{t-1}	1.092**	2.101	0.012
RP	0.645***	4.373	0.000
IT_{t-1}	0.463***	4.873	0.000
IT	2.101***	5.404	0.000
EG_{t-1}	1.998***	3.464	0.000
EG	0.746***	5.484	0.000
PG_{t-1}	0.091***	4.382	0.001
PG	0.765***	4.466	0.000
Cons	2.187***	4.377	0.000

R square = 61.272 Stimulation = 5000

5. Discussions

The findings indicated a positive correlation between rice import and farmers' income. This correlation is substantiated by Putra (2019), who posits that an escalation in rice import leads to an augmentation in foreign food supplies, resulting in diminished demand for domestic agricultural food products. This disruption adversely affects agricultural production and disrupts farmers' incomes. These findings align with Nwahia (2021), who emphasizes that an increase in rice imports leads to a financial outflow as the price of rice and investments in the domestic agriculture system decrease. Consequently, farmers experience reduced incomes.

The findings revealed a positive correlation between rice production and farmers' income. This alignment is substantiated by Olounlade et al. (2020), suggesting that an increase in rice production results in a higher volume of rice available for sale in the market. The subsequent rise in total agricultural sales contributes to increased earnings for agricultural firms, translating into more substantial usable incomes for farmers. Therefore, greater rice production corresponds to elevated incomes for farmers. These outcomes are also consistent with Alamgir et al. (2021), asserting that an upswing in rice production leads to a reduction in the import of rice or alternative food products. Consequently, the financial resources saved are reinvested in agriculture, leading to an improvement in farmers' income levels.

The findings indicated a positive correlation between international trade and farmers' income. These results are also consistent with Boysen et al. (2023), asserting that agricultural firms engaged in international trade have the opportunity to acquire necessary resources and sell any surplus without incurring losses. Consequently, agricultural profits are safeguarded, and farmers' income is sustained. Additionally, these results are supported by van Wesenbeeck et al. (2021). The aforementioned study further affirms that the promotion of international trade and the permission to export agricultural products globally enable agricultural farmers to secure substantial amounts of foreign exchange and increase their incomes.

The findings revealed a positive correlation between economic growth and farmers' income. These results align with Rahman and Mishra (2020), emphasizing that a nation experiencing heightened economic growth can allocate resources for agriculture, expanding its revenues in the agricultural sector, ultimately leading to an augmentation of farmers' income. Additionally, these results are consistent with Humphries and Weisdorf (2019), elucidating that during periods of elevated economic growth in a country, farmers possess the capacity to implement technical changes in agricultural practices.

The findings indicate a positive correlation between population growth and farmers' income. These results are substantiated by Marie et al. (2020), asserting that heightened population growth in a country contributes to increased economic activity, as the demand for products and services surges. The corresponding expansion in agricultural practices, aimed at meeting the escalating demand, presents an opportunity for augmented earnings, potentially leading to increased income for farmers. Additionally, these results align with Mulokozi et al. (2020), affirming that elevated population growth propels advancements in the agriculture sector, resulting in higher profits and, consequently, greater incomes for farmers.

6. Implication

The study also has great significance for the farmers who carry the agriculture sector in developing countries like Indonesia. The study guides the policymakers on how to improve the farmer's income, which is a sign of their well-being. The study states that policymakers and economic authorities must try to discourage rice imports and keep a limit so that farmers' income can be preserved. The study also posits that the regulators must take initiatives to increase rice production in order to increase farmers' income. The current study makes a suggestion that the government must form trade policies to encourage international trade and allow the agriculture sector to benefit from international trade. It would help improve farmers' income. There is also a guideline that economic policies should be formed to increase the economic growth rate so that the farmers' incomes can be increased. Moreover, the study conveys that population growth should be controlled and managed to expand agriculture and increase farmers' incomes. The results guided the regulators in making regulations related to enhance the farmers' income by employing restrictions on rice import and also by improving rice production and international trade.

7. Conclusion

The objective of the study was to discern the impact of rice import, rice production, & international trade on farmers' income, while also exploring the roles of economic growth and population growth in influencing farmers' income. The research relied on secondary data, with information sourced from Indonesia statistics. The findings of the study indicate an adverse effect of rice imports on farmers' income. Increased reliance on rice imports to meet domestic demand reduces the demand for domestically produced rice, leading to a consequent decline in farmers' income. Moreover, the study reveals positive associations between rice production, international trade, economic growth, population growth, and farmers' income. Specifically, agricultural firms capable of large-scale rice production can satisfy both national and international demands for food grains, resulting in elevated agricultural revenues and increased income for farmers. Furthermore, engagement in international trade allows agricultural firms to access modern agricultural facilities and expand the marketing of agricultural products, thereby potentially raising farmers' incomes. The study also highlights that substantial population growth and heightened economic growth contribute to the expansion of agriculture, creating the potential for increased farmers' income.

Limitations

The study is not without its limitations, which necessitate attention and mitigation by researchers and academics. Firstly, this investigation exclusively focuses on a limited set of factors, namely rice import, rice production, and international trade, in analysing their impact on farmers' income. Notably absent are considerations of other potentially significant factors such as agricultural administration, technical innovation, and financial inclusion. To enhance the comprehensiveness of the research, academics must address and incorporate these overlooked elements. Secondly, the researchers express their concern specifically for farmers' income in Indonesia, gathering data solely from this region to validate their findings. For future research endeavours, it is imperative to expand the scope by collecting data from diverse economies, ensuring a more nuanced and globally applicable understanding of the subject matter.

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