



PRIMARY RESEARCH

Assessing the Influence of Risk Management Strategies and Government Support Programs on Farm Income: A Principal-Agent Perspective

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Keywords

Risk management strategies
Government support programs
Farm income
Principal-agent perspective
Agency theory

Received: 15 September 2022**Accepted:** 22 November 2023**Published:** 03 March 2023

Abstract

This research paper aims to investigate the influence of risk management strategies and government support programs on farm income, adopting a principal-agent perspective. The study aims to contribute to understanding how farmers' decisions regarding risk management and government programs affect their income levels. The theoretical foundation is based on agency theory, which provides a framework to examine the principal-agent relationship between farmers and external stakeholders. The research employs a quantitative survey method, collecting data from 327 farmers in the South and West Java regions of Indonesia over three months. The results indicate that risk management strategies and government support programs significantly impact farm income. The discussion of the results provides insights into the implications of farmers' risk management strategies and government support programs on farm incomes. Theoretical and practical implications, as well as limitations and future directions, are also discussed.

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INTRODUCTION

Farmers face a multitude of challenges that significantly impact their agricultural operations (Yazdanpanah et al., 2022). Financial risks pose a considerable burden as farmers often invest substantial amounts of money in their operations, including purchasing seeds, equipment, and fertilizers (Tien, Hoang, & Sen, 2022). Unpredictable factors such as weather conditions, crop diseases, and fluctuations in market prices can all contribute to financial losses, making it difficult for farmers to maintain a stable income (Tamru & Minten, 2023). Market uncertainties further complicate matters as farmers must navigate complex supply chains and fluctuating consumer demands (Nor Diana, Zulkepli, Siwar, & Zainol, 2022). They need to anticipate market trends, adjust their production accordingly, and negotiate fair prices for their products. The volatile nature of markets adds a layer of uncertainty, making it challenging for farmers to plan and make informed decisions (Santoso et al., 2023).

Moreover, environmental hazards pose a significant threat to agricultural operations. Climate change has led to more frequent and severe weather events, such as droughts, floods, and storms, which can devastate crops and livestock (Antwi-Agyei & Stringer, 2021). Extreme temperatures and irregular precipitation patterns make it difficult for farmers to predict growing seasons and manage water resources effectively. Environmental hazards also include soil erosion, depletion of natural resources, and the loss of biodiversity (Nor Diana et al., 2022). To mitigate these risks and enhance their income levels, farmers often adopt risk management strategies and participate in government support programs (Luo et al., 2022). Understanding the influence of these strategies and programs on farm income is essential for policymakers, farmers, and researchers. This research paper uses a principal-agent perspective to assess the influence of risk management strategies and government support programs on farm income.

Risk management strategies encompass a range of prac-

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tices employed by farmers to mitigate and manage risks associated with agricultural production, such as crop insurance, diversification, and forward contracting (Ashraf, Asfa, Imran, & Manzoom, 2022; Mphepo & Urassa, 2022). Government support programs refer to the initiatives and policies implemented by governmental agencies to assist farmers, such as subsidies, grants, and technical assistance (Arsil et al., 2022). Despite the significance of risk management strategies and government support programs in agriculture, a lack of comprehensive research examines their impact on farm income from a principal-agent perspective (Rokicki et al., 2021). Existing studies have primarily focused on either risk management strategies or government support programs separately, without considering the combined effect of these factors (Khomruk et al., 2020). This study aims to bridge this academic gap by investigating both variables simultaneously and analyzing their joint influence on farm income.

The research is conducted in the context of the South and West Java regions of Indonesia. These regions are known for their substantial agricultural sector, with diverse farming practices encompassing crops such as rice, vegetables, coffee, and palm oil (Prastiyo & Hardyastuti, 2020). Despite the agricultural significance of these areas, a limited amount of research has been conducted specifically in this context to explore the interplay between risk management strategies, government support programs, and farm income (Adebayo et al., 2021). Researchers can gain valuable insights into how risk management strategies and government programs impact farmers' income levels by focusing on this specific Indonesian context. It is essential to understand the effectiveness of various risk management approaches, such as crop insurance, diversification of crops, or forward contracts, in reducing financial risks and ensuring stable income for farmers in these regions (Arsil et al., 2022). Additionally, examining the role of government support programs, such as subsidies, training initiatives, and infrastructure development, will shed light on their effectiveness in assisting farmers and promoting sustainable agricultural practices.

This study contributes to the existing literature by incorporating agency theory as the theoretical foundation to examine the principal-agent relationship between farmers and external stakeholders. By adopting this perspective, the study acknowledges the inherent information asymmetry and moral hazard issues that arise in the agricultural sector. Additionally, the study explores the joint influence of risk management strategies and government support programs on farm income, providing a comprehensive understanding

of these factors combined impact. The primary objectives of this research are as follows:

- To assess the influence of risk management strategies on farm income.
- To evaluate the impact of government support programs on farm income.
- To present theoretical and practical implications along with future research directions.

By achieving these objectives, the research aims to provide valuable insights into the effectiveness of risk management strategies and government support programs in enhancing farm income from a principal-agent perspective.

THEORETICAL FOUNDATION AND HYPOTHESES DEVELOPMENT

The theoretical foundation of this study is based on agency theory, which provides a suitable framework for analyzing the principal-agent relationship between farmers and external stakeholders. According to agency theory, conflicts of interest arise due to the principal's inability to fully monitor the agent's actions and the agent's tendency to act in their self-interest (Xu, Wang, & Ma, 2022). In the agricultural context, farmers (agents) engage in activities that are not directly observed by external stakeholders, such as lenders, insurers, and government agencies (principals) (Chen, Wang, & Wang, 2023). Farmers adopt risk management strategies to minimize the negative impact of risks on their income. These strategies include the use of insurance, forward contracting, diversification, and hedging. The adoption and implementation of these strategies are influenced by factors such as farmers' risk preferences, access to information, financial resources, and knowledge of risk management tools (Shukla, Kapoor, Gupta, & Arunachalam, 2023). By effectively managing risks, farmers can enhance their income stability and financial well-being. Government support programs play a crucial role in promoting risk management and enhancing farm income (Riaman, Sukono, Supian, & Ismail, 2022). These programs encompass a variety of measures, including subsidies, grants, technical assistance, and educational programs. Government support can significantly impact farmers' decision-making processes by reducing the cost of risk management tools, providing access to capital, and improving knowledge and skills (Barkatullah et al., 2021; Mohamed & Tawfik, 2023). However, the effectiveness of these programs may vary depending on factors such as program design, targeting mechanisms, and farmers' awareness and participation. By integrating agency theory, this study aims to examine the relationship between farmers' risk management strategies,

government support programs, and farm income. The theoretical framework suggests that risk management strategies and government support programs can act as mechanisms to align the interests of farmers and external stakeholders, reducing information asymmetry and addressing moral hazard issues. Consequently, farmers who effectively adopt risk management strategies and actively participate in government support programs are expected to experience higher farm incomes.

Impact of Risk Management Strategies on Farm Income

Risk management strategies play a crucial role in mitigating the negative impact of risks on farm income. Farmers who adopt effective risk management practices can minimize the financial losses caused by uncertain events such as adverse weather conditions, price fluctuations, and market uncertainties (Kyire, Kuwornu, Bannor, Apiors, & Martey, 2023). These strategies enable farmers to protect their investments, stabilize income, and ensure long-term sustainability. The adoption of risk management strategies can enhance farm income through various mechanisms. For instance, insurance is a commonly used risk management tool that compensates for losses caused by covered perils (Ketsiri & Pajongwong, 2016; Matchaya, Tadesse, & Kuteya, 2022). Farmers can reduce income volatility and protect themselves against catastrophic events by ensuring their crops or livestock. Insurance enables farmers to recover a significant portion of their losses, ensuring a more stable income stream.

Likewise, forward contracting allows farmers to secure a predetermined price for their produce before harvest. This practice enables farmers to lock in favorable prices, reducing the risk of price volatility and ensuring a steady income (Shahbaz, Sherafatian-Jahromi, Malik, Shabbir, & Jam, 2016; Zou, Ren, Mishra, & Hirsch, 2022). By entering into forward contracts with buyers, farmers can eliminate uncertainties associated with market fluctuations, enhancing their bargaining power and profitability. Diversification is another risk management strategy that farmers employ to reduce income risk. Farmers can spread their risks across different enterprises by cultivating various crops or engaging in multiple agricultural activities (Smania et al., 2022). Diversification enables farmers to hedge against losses in one sector by generating income from other sources. This strategy helps maintain a more stable and sustainable income stream, especially in the face of uncertain market conditions. Hence, it is postulated that;

H1: There is a positive impact of risk management strate-

gies on farm income.

The Impact of Government Support Programs on Farm Income

Government support programs play a crucial role in promoting farm income by providing financial assistance, access to resources, and knowledge transfer. These programs are designed to address the inherent risks and challenges faced by farmers, supporting their efforts to enhance productivity, profitability, and sustainability. Subsidies are a common form of government support provided to farmers (Hussain, Xuetong, Maqbool, Hussain, & Shahnawaz, 2022). These subsidies can reduce the cost of inputs such as fertilizers, seeds, and machinery, making them more affordable for farmers. By lowering production costs, subsidies contribute to increased profitability and farm income. However, it is essential to design subsidy programs carefully to ensure they reach the intended beneficiaries and do not distort market dynamics (Mohamed & Tawfik, 2023). Grants and financial assistance programs are another means of government support that can positively impact farm income. These programs provide farmers with access to capital for investment in new technologies, infrastructure development, and capacity building (Mphepo & Urassa, 2022). By receiving financial assistance, farmers can improve their production efficiency, expand their operations, and diversify their income sources, ultimately leading to increased farm income.

Technical assistance and educational programs are valuable components of government support programs. Through these initiatives, farmers can gain knowledge and skills related to modern farming practices, sustainable agriculture, and advanced technologies (Nor Diana et al., 2022). By acquiring up-to-date information and adopting best practices, farmers can enhance their productivity, reduce production costs, and improve the quality of their produce. This, in turn, can result in higher market prices and increased farm income. Government support programs also contribute to income stabilization and risk reduction. For example, income insurance programs can provide a safety net for farmers, compensating for income losses during unfavorable periods (Hanson et al., 2022). By participating in these programs, farmers can mitigate the impact of income fluctuations, ensuring a more stable and predictable income stream. Hence it is postulated that;

H2: There is a positive impact of government support programs on farm income.

Theoretical Framework

The theoretical framework of this study, as shown in Figure 1, is based on agency theory, which examines the principal-agent relationship between farmers and external stakeholders. In this context, farmers act as agents who make decisions regarding risk management strategies and government support programs. External stakeholders, such as lenders, insurers, and government agencies, act as principals who aim to align the interests of farmers with their own objectives.

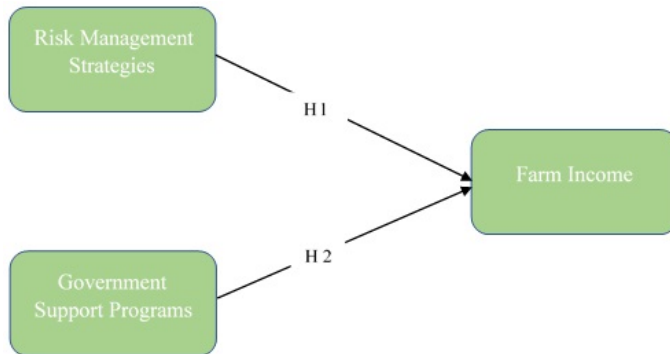


FIGURE 1. Theoretical framework

RESEARCH METHODS

A quantitative survey research method was employed to collect data for this study. The target population consisted of farmers in the South and West Java regions of Indonesia. The sample of farmers was selected using stratified random sampling. The data collection process took place from December 1, 2023, to April 30, 2023, covering a period of five months. To collect data, a structured questionnaire was developed based on the research objectives and theoretic

cal framework. The questionnaire consisted of three sections: demographic characteristics, measures of the study, and farmers' perceptions and experiences related to risk management strategies and government support programs. Prior to data collection, ethical considerations were addressed by obtaining informed consent from the participants and ensuring confidentiality and anonymity. In total, authors received 327 valid responses. The collected data were then entered into a statistical analysis software program for further analysis. Descriptive statistics, correlation analysis, and regression analysis were performed to examine the relationships between risk management strategies, government support programs, and farm income. The statistical significance level was set at $p < 0.05$ to determine the significance of the findings.

The majority of the respondents were in the age group of 31-50, representing 67.3% of the sample. In terms of gender, 70.3% of the respondents were male, while 29.7% were female. Regarding education level, 40.4% of the respondents held a bachelor's degree, followed by 42.8% with secondary school education. The farm size distribution showed that 42.8% of the respondents had a medium-sized farm (2-5 hectares), while 29.7% had a large-sized farm (>5 hectares). In terms of farming experience, the largest group (40.4%) had 11-20 years of experience. These demographic characteristics provide a comprehensive overview of the sample and will be considered when interpreting the study results in relation to the respondents' profiles.

ANALYSIS AND RESULTS

Descriptive Statistics

TABLE 1. Descriptive statistics for variables

Variables	Mean	Std. Deviation	Skewness	Kurtosis
Risk Management Strategies	3.42	0.78	-0.17	-0.10
Government Support Programs	3.89	0.95	-0.07	-0.12
Farm Income (in IDR)	18 billion	5,200,000	0.32	0.09

Table 1 presents the descriptive statistics for the variables under investigation. The mean score for risk management strategies was 3.42, indicating that, on average, farmers moderately adopted risk management strategies. The standard deviation of 0.78 indicates a moderate level of variability in the adoption of these strategies among the respondents. The skewness value of -0.17 indicates a slightly negative skew, suggesting a slight leftward deviation from the normal distribution. The kurtosis value of -0.10 indicates a relatively flat distribution, indicating a lack of extreme scores. For government support programs, the mean score

was 3.89, indicating a relatively high level of participation and utilization of these programs among the farmers. The standard deviation of 0.95 suggests a moderate level of variability in the utilization of government support programs. The skewness value of -0.07 indicates a slightly negative skew, suggesting a slight leftward deviation from the normal distribution. The kurtosis value of -0.12 suggests a relatively flat distribution, indicating a lack of extreme scores. In terms of farm income, the mean income was IDR 18 billion, with a standard deviation of IDR 5,200,000. The positive skewness value of 0.32 indicates a slightly right-skewed

distribution, suggesting some higher-income outliers. The kurtosis value of 0.09 suggests a near-normal distribution, indicating a moderate concentration of scores around the mean.

Correlation Analysis

TABLE 2. Correlation matrix of variables

Variables	1	2	3
Risk Management Strategies	1.00		
Government Support Programs	0.56**	1.00	
Farm Income	0.34**	0.45**	1.00

Note. **Correlation is significant at the 0.01 level (2-tailed).

Table 2 presents the correlation matrix, showing the relationships between the variables. The correlation analysis revealed a significant positive correlation between risk management strategies and government support programs ($r = 0.56, p < 0.01$), indicating a moderate positive relation-

ship. This suggests that farmers adopting more risk management strategies are more likely to participate in government support programs. Furthermore, a significant positive correlation was found between risk management strategies and farm income ($r = 0.34, p < 0.01$). This indicates a moderate positive relationship between the adoption of risk management strategies and farm income. Farmers who effectively implement risk management strategies are more likely to achieve higher farm incomes. Similarly, a significant positive correlation was observed between government support programs and farm income ($r = 0.45, p < 0.01$). This suggests a moderate positive relationship between the utilization of government support programs and farm income. Farmers actively participating in government support programs are more likely to experience higher farm incomes.

Regression Analysis

TABLE 3. Regression Analysis Results

Variables	β	SE	t -value	p -value
Risk Management Strategies	0.253	0.112	5.043	<0.001
Government Support Programs	0.241	0.098	4.838	<0.001

Table 3 presents the regression coefficients, standard errors, standardized beta coefficients, t -values, and p -values. The results indicate that risk management strategies significantly influence farm income ($\beta = 0.253, p < 0.001$). For every unit increase in the adoption of risk management strategies, there is an estimated increase of 0.253 units in farm income. This suggests that effective implementation of risk management strategies can lead to higher farm incomes. Similarly, government support programs also significantly positively influence farm income ($\beta = 0.241, p < 0.001$). For every unit increase in the utilization of government support programs, there is an estimated increase of 0.241 units in farm income. This indicates that active participation in government support programs can contribute to higher farm incomes. The regression analysis confirms the significant positive influences of both risk management strategies and government support programs on farm income. These findings support the hypothesis that farmers who adopt effective risk management strategies and actively engage in government support programs are more likely to achieve higher levels of farm income.

DISCUSSION AND CONCLUSION

The findings of this study highlight the significant impact of farmers' risk management strategies on farm incomes.

The regression analysis revealed a positive relationship between the adoption of risk management strategies and farm income. This implies that farmers who effectively implement risk management strategies are more likely to experience higher levels of income (Matchaya et al., 2022). One of the key risk management strategies identified in this study was insurance. Farmers who insured their crops, livestock, or farm assets were better protected against income losses resulting from adverse events such as natural disasters, diseases, or market fluctuations (Antwi-Agyei & Stringer, 2021). Insurance provided a safety net, allowing farmers to recover from losses and maintain a stable income.

Additionally, the use of diversification strategies was found to positively influence farm income. Farmers who diversified their agricultural activities by growing multiple crops, raising different types of livestock, or engaging in non-farm activities were able to spread their risks and capture opportunities in various markets. Diversification reduced the reliance on a single income source and increased the resilience of farmers' incomes (Kyire et al., 2023). Furthermore, the adoption of advanced technologies and best practices in farming was associated with higher farm incomes. Farmers who embraced modern agricultural techniques, such as precision farming, the use of improved seeds and fertilizers, and efficient irrigation systems, were able to en-

hance productivity, reduce production costs, and ultimately improve their income levels (Adeyinka et al., 2022).

The findings of this study reveal the significant impact of government support programs on farm incomes. The regression analysis showed a positive relationship between the utilization of government support programs and farm income, indicating that farmers actively participating in these programs are more likely to achieve higher income levels. Government support programs provide financial and non-financial assistance to farmers, aiming to enhance their productivity, profitability, and resilience. One of the key support programs identified in this study was access to credit and loans (Mohamed & Tawfik, 2023). Farmers who had access to affordable credit facilities were able to invest in their farming operations, such as purchasing machinery and inputs or expanding their land holdings. This, in turn, led to increased productivity and higher farm incomes.

Furthermore, government programs that provided technical assistance and training positively influenced farm incomes. Farmers who received training on modern agricultural practices, agribusiness management, or value chain development were able to improve their skills and knowledge, leading to enhanced productivity and income-generating opportunities (Qiao et al., 2022). Technical assistance also included guidance on risk management strategies, enabling farmers to make informed decisions and mitigate potential income risks. Government programs facilitating market access and promoting value addition were also associated with higher farm incomes (Li, Wang, Liao, & Wang, 2022). Farmers who could access better markets through direct sales or participation in value chain initiatives could obtain higher prices for their agricultural products. Market linkages and value-addition activities, such as processing and packaging, added value to farmers' produce, allowing them to capture a larger share of the value chain and increase their incomes.

Theoretical Implications

This study holds several theoretical implications that contribute to the existing body of knowledge in the field of agricultural economics and risk management. Firstly, the study adopts a principal-agent perspective in examining the influence of risk management strategies and government support programs on farm income. This theoretical framework provides a comprehensive lens through which the interactions and dynamics between farmers (agents) and external stakeholders (principals) can be analyzed. By considering the principal-agent relationship, the study elucidates the mechanisms by which risk management strategies and

government support programs influence farmers' income outcomes. Secondly, the study builds on the existing literature by empirically assessing the joint influence of risk management strategies and government support programs on farm income. While previous studies have examined the impact of individual factors on farm income, this study extends the understanding by investigating the combined effects of risk management strategies and government support programs. This holistic approach recognizes that farmers' income outcomes are influenced by a complex interplay of multiple factors, both within and outside the farm. Moreover, the study contributes to the theoretical understanding of risk management strategies by highlighting the role of insurance, diversification, and technology adoption in improving farm incomes. By emphasizing the importance of these strategies, the study underscores their potential as effective mechanisms for income stabilization and enhancement in agricultural systems.

Practical Implications

The findings of this study hold several practical implications for policymakers, agricultural extension services, and other relevant stakeholders involved in supporting farmers and promoting sustainable agricultural development. Firstly, the study emphasizes the importance of promoting and supporting the adoption of risk management strategies among farmers. Policymakers should design and implement policies that facilitate access to agricultural insurance, encourage diversification practices, and promote the adoption of advanced technologies. By providing financial incentives, training programs, and technical assistance, policymakers can facilitate the adoption and effective implementation of risk management strategies, ultimately enhancing farmers' income levels and reducing income volatility. Secondly, the study highlights the significance of government support programs in improving farm incomes. Policymakers should prioritize the provision of accessible credit facilities to farmers, enabling them to invest in their farming operations and improve productivity. Training programs and technical assistance should also be expanded to provide farmers with the necessary knowledge and skills to enhance productivity, manage risks, and tap into market opportunities. Strengthening market linkages, promoting value addition, and supporting farmers' participation in value chain initiatives are also important practical measures that can contribute to higher farm incomes. Furthermore, policymakers should consider tailoring support programs to the specific needs and contexts of farmers. Recognizing the heterogeneity among farmers, it is

crucial to develop targeted interventions that address the diverse challenges faced by different farming systems, regions, and farmer groups. This requires conducting thorough assessments of farmers' needs, engaging in participatory approaches, and involving farmers in the design and implementation of support programs.

Limitations and Future Directions

This study, despite its contributions, is not without limitations. Three notable limitations are identified, and future research directions are suggested. Firstly, the study focused on farmers in the South and West Java regions of Indonesia. Generalizing the findings to other regions or countries should be done with caution, as the agricultural contexts and characteristics may differ. Future studies could expand the geographical scope to include a more diverse sample of farmers from different regions, countries, or agricultural

systems. Secondly, this study relied on self-reported survey data, which may be subject to response bias or social desirability bias. Future research could incorporate other data collection methods, such as interviews or observational studies, to supplement the survey findings and provide a more comprehensive understanding of the relationships between risk management strategies, government support programs, and farm incomes. Thirdly, this study focused on the influence of risk management strategies and government support programs on farm incomes. Future research could explore additional factors that may interact with or moderate these relationships, such as farmers' characteristics (e.g., education level, experience), market conditions, or institutional factors. Understanding the complex interplay of these factors can contribute to a more nuanced understanding of the determinants of farm income.

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