

Do Poor Paddy Farmers Benefit from Increasing Rice Prices?

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Abstract— A policy of high rice prices can increase paddy farm incomes but also cause a rise in rice expenditures for farm households. Such a policy is needed to stimulate production but can harm rice consumers, especially poor families. We surveyed 284 paddy farmers in Gantar Sub-District, Indramayu Regency, Indonesia to analyze the impact of increasing rice prices on farmers' net incomes, including poor paddy farmers. We found that a price increase benefits farmer if the price transmission elasticity is more than 0.2 for non-poor paddy farmers or 0.6 for poor paddy farmers. A high rice price policy can benefit paddy farmers if there is good price transmission in the market. Good transmission requires a strong rice market efficiency channel

Keywords— Rice Prices, Paddy Prices, Poor Farmers, Farmer Net Income, Price Transmission, Rice Marketing

1. Introduction

The Rice is the main staple food in Indonesia [1], and it is a strategic commodity for the Indonesian people. The availability of rice is a strategic issue of food security in Indonesia. Thus, food security must be supported through paddy production. To support paddy production, paddy farming must be profitable. Paddy farming can be profitable if the paddy price is high enough to cover all the costs of paddy farming. As such, an increase in paddy prices could be cause an increase in farm paddy production [2].

One of the factors affecting paddy prices is the rice price. According to [3], rice prices influence paddy prices; this means that the paddy price can increase if the rice price increases. This is achieved through price transmission. According to [4], price transmission is the impact of prices at one level on prices at another level, either up or downstream. This transmission in the food chain market. Rice and paddy are a food chain in the rice market. Rice price increases are significant in that they stimulate farmers to increase paddy production. To increase the rice price, and thereby overall food security, a high price policy must be implemented by the government. However, such policies must be carefully crafted because they can harm rice

consumers and increase poverty [5]. When the rice price goes up, families will need to spend more on food, reducing the real income of the Indonesian people. Likewise, a rise in rice prices will also reduce the income of paddy farmer households and even increase the poverty of paddy farmers, especially small farmers [6].

The aim of a high rice price policy is to improve the welfare of paddy farmers so that they increase paddy production, yet [6] asserts that it could actually reduce the income of small farmers and increase poverty. This leads to the research questions: Is increase rice price will benefit paddy farmers, including poor farmers?

This study analyzes the influence of rice prices on farmers' income and poverty. In a similar investigation, [7] find that increasing the domestic rice price in Vietnam raises farm income and reduces poverty. Also in Vietnam, [8] find that high food prices influence farmer welfare and decrease poverty. Another study that supports the notion that rice prices influence farm welfare is from [9]. They find that in Pakistan, increasing the price and sale of rice can improve farmer welfare.

Other research, however, has reached the opposite conclusion, like the study by [6]. His result indicates that the number of rural consumers of rice is higher than paddy production. Thus, if rice prices are raised, more people will be harmed, outweighing the benefit to farmers. Only large farmers will benefit from raising rice prices. As a result, only a few farmers benefit, while the majority are harmed. In addition, [10] concludes that a policy of high rice prices does not support poor families, including the rice farmers themselves.

The research above does not clearly answer the question of whether a high rice price policy increases paddy farmers' income and reduces farmer poverty. To enrich the previous literature on the topic, this study adds the variable of price transmission elasticity from rice price to paddy price. This variable may be a key to why previous studies have reached such different results. High price transmission elasticity can lead to high farm income, and vice versa. Another variable that can impact the elasticity of price transmission is market

bargaining. Small and poor farmers occupy weaker market bargaining positions compared to large and medium-sized farmers [12] The novelty of this research is the introductions of the process of rice price transmission to the paddy price, which increases farm income. However, an increase in rice prices also increases the household expenditures of farmers. If the increase in farm income is higher than the increase in rice expenditure, then a high price policy benefits paddy farmer. If the additional farm income does not exceed the additional expenditure, the policy does not benefit paddy farmers.

Increasing the price of rice can benefit paddy farmers, but does increasing the price benefit poor farmers? According to [6], increasing rice prices can stimulate poverty, including among small farmers. To answer this question, research into the effect of increasing rice prices on poor farmers is needed. The purpose of this study is to analyze the impact of increasing rice prices on the net income of both poor and non-poor farmers.

2. Research Method

2.1. Variables

The variables in this research are those relevant to farmers' net income; these variables are shown in Table 1.

Table 1. The Research Variables

Variables Name	Variables Label	Unit
X1	Paddy price	IDR/Kg
C1	Paddy sold	Kg/Season
C2	Farm revenue	IDR/Season
C3	Farm cost	IDR/Season
C4	Farm profit	IDR/Season
C5	Farm income	IDR/Month
C6	Non-Farm income	IDR/Month
C7	Farmer total income	IDR/Month
Y	Net-Farmer income	IDR/Month
C8	Farmer total expenditure	IDR/Month
C9	Food expenditure	IDR/Month
C10	Non-food expenditure	IDR/Month
C11	Non-rice expenditure	IDR/Month
C12	Rice expenditure	IDR/Month
C13	Rice Consumption	Kg/Month
X2	Rice price	IDR/Kg

X1 is the paddy price; the price used this research is the price in Indonesia called "Gabah Kering Giling" or the paddy after the harvest is converted into grains. The unit is IDR/Kg. C1 is the paddy sold. In this study, it is only the paddy that is sold into the market. The paddy sold is not the same as the paddy production because not all paddy produced is sold. The farmers save some of their paddies for family consumption. The unit is sold in Kg/Season because farmers sell products after harvest for one season. C2 is farm revenue. This

revenue is all paddy sold multiplied the price in one season. The unit is IDR/Season. C3 is farm cost, and this includes all costs to produce paddy products. The unit is IDR/Season. C4 is farm profit. The profit is revenue minus cost, and the unit is IDR/Season. C5 is farm income. This variable is farm profit (farm revenue minus farm cost) divided in four-month increments (one season is, on average, four months), so the unit is IDR/Month. C6 is non-farm income. Farmers usually have a non-farm job, such as entrepreneurship, industrial work, or construction work. The unit is IDR/Month. X7 is total income. This variable is the household income from farm and non-farm work. The unit is IDR/Month. Y is net farmer income. This is the net household income, which is total income minus total expenditure.

Total expenditure (C8) consists of food expenditure (C9) and non-food expenditure (C10). The food expenditure consists of non-rice expenditure (C11) and rice expenditure (C12). Rice expenditure is rice consumption multiplied by the rice price (X2). These are the main variables of this research. For all farmer expenditure variables, the unit is IDR/month.

The interaction of these variables is explained in Figure 1.

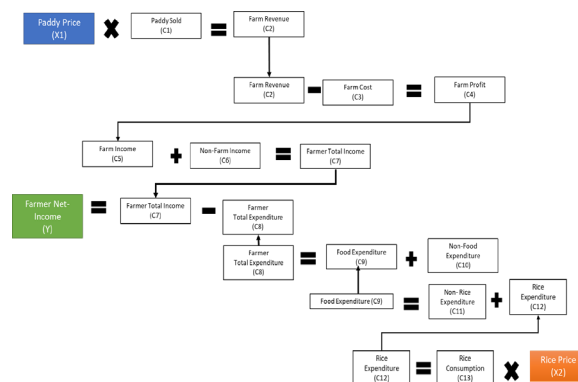


Figure 1. Relationship between Research Variables

Logically, a farmer's net-income (Y) is the farmer's total income (C7) minus total expenditure (C8). The farmer's total income is farm income (C5) added to non-farm income (C6). Farm income (C5) is farm profit (C4), and the unit of farm profit (C4) is one season. Farm profit is farm revenue (C2) minus farm cost (C3). Farm revenue is the paddy price (X1) multiplied by paddy sold (C1). The farmer's total expenditure (C8) is his or her food expenditure (C9) plus non-food expenditure (C10). The food expenditure (C9) is non-rice expenditure (C11) plus rice expenditure (X2). There are three types of variables: independent variables, dependent variables, and variables that are assumed (catteries paribus) to be constant. The independent variables are X1 and X2. The dependent variable is Y, the farmer's net income.

The constant variables are C1-C11. These variables are assumed to be constant to simplify the influence of rice price on farmers' net income.

2.2. Analysis

The analysis subjects are divided into two groups. The first group is non-poor farmers, and the second group is poor farmers. The poor farmers are defined as farmers with income below the poverty line. According to the Bureau Statistics of Indonesia (BPS) the poverty line in Indramayu Regency (Region of research) is 447,378 IDR/Month/Capita [13]. The poor farmers in this research are those with household incomes under IDR 447,378 per family member per month.

This study investigates the effect of a 10% increase in the price of rice on net farm income for both groups. An increase in rice price can increase the paddy price, which then increases farm income, but increasing the rice price can also increase rice expenditures for farm households. The final goal is to understand the impact of increasing the rice price net farmer income; that is, does it increase or decrease net farmer income.

The effect of an increase of rice price on the paddy price is defined in this research as the price transmission elasticity. If an increase in rice price causes the same level of increase in the paddy price, then the price transmission is one. If increasing the rice price increases the paddy price by 50%, then price transmission is 0.5. Finally, if the increase does not increase the paddy price, then the price transmission is zero. We examine different price transmission scenarios from one to zero.

2.4. Data Source

The data sample is farmer households in Gantar Sub-district, Indramayu Regency, West Java Province, Indonesia. Gantar Sub-district was chosen because this region has the highest paddy production of Indramayu Regency [14]. The Indramayu Regency was chosen because it has the highest paddy production in West Java Province [15]. The West Java Province was chosen because this province is one of Indonesia's main paddy producers.

The respondents were chosen by simple random sampling. The number of samples is calculated by the formula:

$$n = \frac{t^2 \times S^2}{d^2}$$

n = Number of samples

t = t table at $\alpha=0.05$

S = Standard Deviation

d = Deviation

This formula follows [16] and calculates the number of samples in the survey. The t table of $\alpha=0.05$ is 1.96. The number of standard deviations was gathered from a pilot survey of the farmers'

land size it is 0.83. The deviation of the farmland farm is 0.1 ha. The number of samples according to this formula is:

$$n = \frac{(1.96)^2 \times (0.83)^2}{(0.1)^2} = 267.005$$

Therefore, the minimum samples are 267.005, so the sample must be higher than 267.005. For this research, the sample is 268.

3. Result

The respondents were divided into two groups. The first group is non-poor farmers; those with a household income above IDR 447,378 per family member per month. The second group is poor farmers who have a household income under IDR 447,378 per family member per month. We received survey responses from 224 non-poor farmers and 44 poor ones. The respondents were interviewed, and the results are shown in Table 2.

Table 2. Result

Name	Variables Label	Unit	Mean	
			Non-Poor	Poor
X1	Paddy price	IDR/Kg	4,736.87	4,629.73
C1	Paddy sold	Kg/Seas	4,097.00	1,708.11
		IDR/Se	19,406,96	7,908,07
C2	Farm revenue	ason	3.30	8.89
		IDR/Se	9,567,566	5,901,09
C3	Farm cost	ason	.07	0.91
		IDR/Se	9,839,397	2,006,98
C4	Farm profit	ason	.23	7.98
		IDR/M	2,459,849	501,747.
C5	Farm income	onth	.31	00
		IDR/M	2,408,661	1,893,56
C6	Non-Farm income	onth	.22	7.07
		IDR/M	4,868,510	2,395,31
X7	Farmer total income	onth	.53	4.07
		IDR/M	2,187,095	211,723.
Y	Net-Farmer income	onth	.35	16
		IDR/M	2,681,415	2,183,59
C8	Farmer total expenditure	onth	.18	0.91
		IDR/M	1,810,793	1,379,14
C9	Food expenditure	onth	.33	0.26
		IDR/M	884,316.9	849,386.
C10	Non-food expenditure	onth	6	36
		IDR/M	1,305,468	776,363.
C11	Non-rice expenditure	onth	.75	64
		IDR/M	505,324.5	602,776.
C12	Rice expenditure	onth	8	63
		Kg/Mo		
C13	Rice Consumption	nth	48.99	53.07
				11,358.5
X2	Rice price	IDR/Kg	10,315.57	3

The values shown in Table 2 are the mean variables for the non-poor farmers and poor farmers. This data is used to calculate the net farmer income if the rice price is increased by 10%. The results of the scenario are shown in Table 3.

Table 3. Result of Scenario

Price Transmission elasticity From Rice Price to Paddy Price	Net Income Increase for Non-Poor Farmers (IDR/Month)	Net Income Increase for Poor Farmers (IDR/Month)
1	420,946.51	92,488.59
0.9	372,429.10	72,718.39
0.8	323,911.70	52,948.20
0.7	275,394.29	33,178.00
0.6	226,876.88	13,407.80
0.5	178,359.47	-6,362.40
0.4	129,842.06	-26,132.59
0.3	81,324.65	-45,902.79
0.2	32,807.25	-65,672.99
0.1	-15,710.16	-85,443.18
0	-64,227.57	-105,213.38

The scenario includes multiple conditions of price transmission from 1 to 0. The table shows that for non-poor farmers, increasing rice prices can increase their net farm income if the price transmission is more than 0.2. However, for poor farmers, their net income is increased only if the price transmission is greater than 0.6.

4. Equations

We found that the increase would benefit paddy farmers if the price transmission elasticity is 0.2. That means a 100% rice price increase must be followed by an increase in the paddy price of at least 20%. For poor paddy farmers, the required price transmission is higher; the price transmission elasticity must be at least 0.6.

[12] find that the regression coefficient of price transmission from rice to paddy price is 1.03 for large-scale farmers, 0.62 for medium-scale farmers, and 0.52 for small-scale farmers. From that research, we can conclude that increasing the price of rice benefits large and medium-sized farmers but not small farmers. According to the research of [17] in Indonesia, farmers with under 0.62 Ha of land are poor. The small farmers in [12] are farmers with less than 0.5 ha of land, so small farmers are poor farmers. [18] study rice marketing in Bangladesh and find that rice price transmission there is 0.29. That means that for non-poor farmers, increasing the rice price is beneficial, but that is not the case for poor paddy farmers. The research of [19] in North Sumatera, Indonesia finds that elasticity of price transmission from rice price to paddy price, at harvested dry grain, for premium rice is 0.482, whereas for medium-quality rice it is 0.379. This result supports the finding that increasing the price of rice can benefit paddy

farmers, but not poor paddy farmers. Price transmission elasticity in Cambodia between farms and the wholesale market is 0.91 and between farms and the retail market is 0.82. It may be that Cambodia has more efficiency in the rice market compared to Indonesia, so the price transmission elasticity is higher than in the Indonesian rice market. However, their study does not divide the sample into non-poor and poor paddy farmers.

The above research finds different results with respect to price transmission elasticity because of the different locations and different farmers that were studied. The different locations have varying levels of efficiency in their rice marketing channels. This may be why the results of some earlier research [7][8][9] indicate that increasing rice prices can improve farmer incomes and reduce poverty, while others reach the opposite conclusions [6][10]. However, this explanation is only a supposition, and is a question for future research.

This research has limitations, we only looked at the influence of rice price transmission elasticity on the net income of non-poor and poor farmers. However, paddy prices are not the only determinant of farmer income; many variables influence net farmer income. In addition, we only examine the increase in paddy prices due to an increase in rice prices. Rice prices can increase paddy prices and improve farmer incomes but increasing the rice price can also increase household expenditures for the farmer. To simplify the analysis, we also assumed some constants. Another limitation is that this research does not include a rice market analysis. We determined price transmission values from previous research only. Including a rice market analysis would enrich the research.

This research suggests a dilemma for policies that increase the price of rice. On one side, such policies are needed to stimulate rice production, which is needed to maintain food security. However, on another side, such policies can increase poverty, including among paddy farmers themselves. The findings imply that governments must analyze the rice market efficiency in the region, which will inform the policy.

5. Conclusion

A high rice price policy can improve the net incomes of paddy farmers if the price transmission elasticity from rice to paddy price is more than 0.2 for non-poor farmers and 0.6 for poor farmers. Previous studies have found that actual price transmission is below 0.6 for poor farmers. That means that a policy that increases the price of rice would benefit non-poor paddy farmers but not poor paddy ones. The implication of this is that governments must carefully consider whether such a policy should be put in place.

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