

IMPACT OF RICE TRADE LIBERALIZATION ON FARM HOUSEHOLDS IN CENTRAL JAVA

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ABSTRAK

Tujuan dari penelitian adalah untuk mengkaji dampak liberalisasi perdagangan beras terhadap rumah tangga petani, yang mana harga beras berdampak pada rumah tangga petani di Jawa Tengah, Indonesia. Dengan menggunakan data mikro rumah tangga yang diambil di Jawa Tengah, kami menguji dampak liberalisasi perdagangan beras dengan pertimbangan adanya kegagalan pasar tenaga kerja (*labor market failure*). Untuk tujuan tersebut, kami memisahkan antara analisis total pendapatan rumah tangga dengan hasil produksi yang dikonsumsi sendiri (*including self-consumption*) dengan total pendapatan rumah tangga tanpa hasil produksi yang dikonsumsi sendiri (*excluding self-consumption*); efek perubahan harga beras akibat diberlakukannya liberalisasi perdagangan diuji pengaruhnya terhadap pendapatan riil rumah tangga petani.

Hasil estimasi fungsi determinasi pendapatan menunjukkan bahwa harga beras mempunyai dampak negatif terhadap pendapatan rumah tangga tanpa adanya hasil produksi yang dikonsumsi sendiri, akan tetapi tidak mempunyai signifikansi pengaruh terhadap pendapatan rumah tangga dengan hasil produksi yang dikonsumsi sendiri. Hal ini terjadi karena penurunan harga beras meningkatkan surplus beras yang diperdagangkan (*the marketed surplus of rice*) dan pendapatan riil rumah tangga.

Key words: Liberalisasi Perdagangan, Harga Beras, Konsumsi Sendiri, Pendapatan Rumah Tangga, Fungsi Determinasi Pendapatan

INTRODUCTION

Although the Indonesian rice policy was effective in the 1980s, it became less effective in the 1990s because the government reduced its subsidies and investments in rice production (Kajisa and Akiyama; 2005).

After the economic crisis, following the recommendation of the International Monetary Fund (IMF), the government lifted all non-tariff trade barriers on rice in order to challenge the import monopoly of the government agency (Bulog). As a result, the rice trade regime changed from one under government control to one based on free trade, with a 30% import tariff applied in the period 2000–2004 (Yonekura, 2005).

Since January 2004, the government has removed the import tariff and imposed a rice import ban. After the import ban policy commenced, the domestic price of rice rose abruptly, surpassing even the rising global rice prices (see Fig.1).

The Ministry of Agriculture asserts that an import ban is required to establish self-sufficiency in staple food production, and the

negative impact of price increases on the poor can be offset by anti-poverty programs such as

OPK (Operasi Pasar Khusus) and Raskin (Beras untuk Keluarga Miskin). However, in several studies concerning the impact of such direct policies on poverty reduction, it is suggested that the policies are not very effective toward reducing the prevailing market price of rice (for the literature, see McCulloch, 2008).

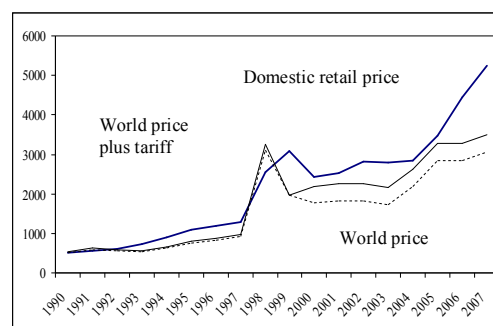


Figure 1. Trends in Rice Prices in Indonesia

Source: International Rice Research Institute and Bulog. Domestic retail price refers to the price of medium rice in Indonesia, while world price refers to the price of Thailand White rice, 100% second grade, f.o.b. (free on board) Bangkok. The tariffs are 5% (in 1990–1998) and 0% (in 1999); Rp 430 per kilogram (in 2000–2007).

Thus, the large price increase has led to debates about the impact of rising prices on the poor and on food security.

There are several significant studies related to this topic. Sawit (2008) and Roosiana (2008) support the present rice policy.

In contrast, McCulloch (2008), Warr (2005), and Sayaka et al. (2007) suggest that the trade liberalization of rice has a positive impact on the welfare of the poor and that in the absence of trade liberalization the self-sufficiency ratio of rice will decline.

Sawit and O'Brien (1995) find that an increase in rice prices leads to an increase in both household income and the marketable surplus of rice. In their study, they applied a household model to their data.

All the above studies have their own drawbacks. Sawit (2008) and Roosiana (2008) do not provide sufficient empirical evidence to prove their views. McCulloch (2008) incorporates an analytical method but applies the assumption that the shares of rice income and expenditure are fixed; moreover, he does not take into consideration the income and substitution effects of rice price changes. If we take those effects into account, the simulation results might change because it is possible that the share varies in accordance with of rice price changes.

Warr (2005) and Sayaka et al. (2007) make use of general equilibrium models in which they assume that the separation property holds for farm household behavior. Although the separation property hypothesis is not rejected by Benjamin (1992) and Pitt and Rosenzweig (1986), it is rejected by a more recent study conducted in Central Java (Mulyo and Fukui, 2006). If the separation property does not hold, the simulation analysis might yield different results (Lofgren and Robinson, 1995; Heerink et al., 2006; Dyer et al., 2006).

Sawit and O'Brien (1995) also assume the profit maximization of farm households. However, if the profit maximization hypothesis does not hold, production elasticity with respect to rice prices might be smaller. Moreover, it is possible that the marketable surplus is smaller than expected when the rice

prices increase (Sadoulet and de Janvry, 1995, ch.6). In such a case, if the income effect of rice price increases is predominant, the marketable surplus might decrease. In order to estimate the impact of rice price increases, it is necessary to take into consideration both the income effect of rice price changes on rice consumption and utility maximization behavior in the case of market failure. These points, which were ignored in the previous literature, are taken into account in this paper. The objective of this paper is to investigate the short-term impact of rice trade liberalization on both the household income and marketable surplus of rice by applying a household model with or without market failure. Toward this purpose, we estimate the income determination function of rural households using survey data pertaining to rural Central Java—one of the main rice producing areas in Indonesia—for which the separation property hypothesis is rejected.

This paper is organized as follows. Section 2 describes the current situation of the surveyed area and the characteristics of the sample households. Section 3 explains the conceptual framework and empirical method of this paper and presents the results of the empirical analysis. Finally, Section 4 concludes the paper.

AGRICULTURE AND HOUSEHOLD ECONOMY IN SURVEYED AREA

The study area includes the Planggok and Somokaton hamlets, which are located in Margokaton Village, Sleman District, Yogyakarta Province. Margokaton Village is located in a lowland rice growing area from where villagers can commute to the city by motorcycle.

Farmers can draw irrigation water from Mataram Canal and the natural springs surrounding the village, even in the dry season. Irrigation conditions are better in Planggok than in Somokaton. Mataram Canal gives the farmers in Planggok Hamlet access to an abundant supply of water throughout the year.

Table 1. Household Characteristics

Characteristics	Planggok Hamlet	Somokaton Hamlet
Number of households	22	30
Number of farm households	18	27
Number of family laborers (person/hh)	4.38	2.87
Area of owned agricultural land (ha/hh):		
Paddy field	0.21	0.14
Farm size (ha/hh)	0.16	0.13
Land use (planted area; ha/hh):	0.31	0.24
Paddy	0.29	0.17
Non-rice crop	0.34	0.25
Yield of paddy (ton/ha/planting)		
Rainy	1.59	1.59
Dry I	1.66	0.82
Dry II	1.92	1.25
Average farm household income (rupiah/year):		
Agricultural income	2,838,854	1,671,277
a. Rice income	2,101,111	1,951,868
b. Non-rice income	8,045,286	1,118,886
c. Livestock and fish	7,831,918	7,360,983
Off-farm income	1,649,615	709,200
Remittance	22,466,784	12,812,214
Farm household income		

Source : Farm Household Survey, 2003

Note : Exchange Rate in 2003 was USD 1 = IDR 8,938.85

In addition, catfish farming—which is more profitable and capital intensive than other fish farming activities—is possible in Mataram Canal. Finally, the triple cropping system can be applied by the farmers in these hamlets.

The main crop in both Planggok and Somokaton is paddy. Some farmers also plant cash crops in the dry season.

We randomly collected the data of 52 sample households belonging to the two hamlets, with the data pertaining to the period from 2001 to 2003. The characteristics of those households and land holdings are shown in Table 1. Note that the average farm size is very small. Farmers usually plant crops twice or thrice annually. Furthermore, although yield is high in a normal year, it is unstable.

The majority of the household heads who participated in this study were farmers (Table 2). However, the majority of the other family laborers were engaged in non-

agricultural occupations. The average wage earned through permanent off-farm occupations is much higher than the agricultural daily wage and agricultural income (see Mulyo; 2006).

Table 2. Occupations of Farm Family Members in Planggok and Somokaton, 2003

Major Occupation			
No	Occupation	Household head (persons)	Family member (persons)
1	Farmer	48	52
2	Non-farm self-employed worker	1	19
3	Daily unskilled laborer	1	19
4	Permanent off-farm worker	2	44

Source : Farm Household Survey, 2003

**CONCEPTUAL FRAMEWORK,
EMPIRICAL MODEL AND ESTIMATION
RESULT**

1. Conceptual Framework

In this study, we use a household model in which a household maximizes its utility subject to three constraints: a production constraint, a time constraint, and a budget constraint. The model is formulated as follows.

$$\text{Max}_{C, X, l, L_f^f, L_h^f, M, T} U(C, X, l, z) \quad (1)$$

$$I = \text{Pr} \cdot C + P_x \cdot X \quad (\text{Budget Constraint}) \quad (2)$$

The optimal household income derived from the above mentioned household model is denoted as an income determination function of certain parameters and is as follows:

(6)

$$I^* = I^*(K, \delta, P_m, P_r, \text{Remittance}, \text{Educ}, R, \bar{T}, w, \bar{L}_f, \bar{L})$$

The optimal total income of a household may increase or decrease due to the change in rice price. As a consequence, the farmer may decrease or increase the marketed surplus of

Table 3. Notation

Notation	Definition
C	food consumption (rice)
X	non-food commodity
P_x	price of non-food commodity
l	leisure
P_r	price of rice
z	household characteristics
I	total household income
θ	random variable (in this study, we use θ as an indicator of harvest, normal harvest, or bad harvest). If bad, $\theta < 1$; if good, $\theta > 1$
F	production of rice
L^f	total labor input for farming (farm labor + hired labor)
\bar{K}	fixed capital
T	land (operated land planted)
δ	parameter condition that affects production
P_m	current input price
M	current input
w	wage rate of hired agriculture labor
L_h^f	hired labor for farming
R	land rent
\bar{T}	owned land
\bar{L}_f	family labor endowment
W	market wage for family labor
Educ	education
L_f^f	family labor input for farming
\bar{L}	maximum time for off-farm family labor

$$Q = \theta F(L^f, M, \bar{K}, T, \delta) \quad (3)$$

(Production Function)

$$wL_h^f + R(\bar{T} - T) + W(\text{Educ})(\bar{L}_f - L_f^f - l) \quad (4)$$

$$I(\text{remittance}) = \theta \text{Pr} F(L^f, M, \bar{K}, T, \delta) - P_m M -$$

(Household Income)

$$\bar{L}_f - L_f^f - l \leq \bar{L} \quad (\text{if constrained, labor market is rationed}) \quad (5)$$

The notation is explained in Table 3.

food (rice). When poor farmers produce a marketed surplus of food, if the income effect is predominant, it is possible that this surplus falls when the price of food rises, (Sadoulet and de Janvry, 1995). This study examines the effect of rice price change on the marketed surplus of food production as well as on household income. Toward this purpose, we use the income determination function excluding the self-consumption of food products from I^* in equation (6).

2. Empirical Model

On the basis of the above conceptual framework, this study will use the following empirical model to estimate the income determination function:

$$I = \alpha_0 + \alpha_1 Educ + \alpha_2 Land + \alpha_3 Asset + \alpha_4 Famlabor + \alpha_5 Damage + \alpha_6 Riceprice + \alpha_7 Occupation + \alpha_8 Fishpond + \alpha_9 Age + \alpha_{10} Fammember + u \quad (7)$$

The definition of each variable is presented in Table 4.

excluding self-consumption. The null hypotheses of individual effect are rejected. Consequently, the Ordinary Least Square (OLS) method is not used to analyze the income determination function. Upon applying the Hausman test to investigate the kind of effect that exists (fixed effect or random effect) with respect to the income determination function, we found that a random effect model should be used to estimate the income determination function.

Table 4. Definitions of the Variables

Variables	Definition
<i>I</i>	Total income of household
<i>Educ</i>	Number of successive years the household head attended school
<i>Land</i>	Total hectares of agricultural land (farmland) in the given year
<i>Asset</i>	Total assets of farm households that engaged in rice farming in the given year
<i>Famlabor</i>	number of family laborer as a proxy for labor endowment
<i>Damage</i>	Percentage of damage in paddy cultivation
<i>Riceprice</i>	Price of a kilogram of rice
<i>Occupation</i>	Dummy occupation of household. If the family member has a non-farming job with higher income, then = 1, otherwise = 0
<i>Fishpond</i>	Dummy fishpond of household. If the household has a fishpond, then = 1, otherwise = 0
<i>Age</i>	Age of household head
<i>Fammember</i>	Total number of family members

3. Estimation Results

Panel data analysis is applied to estimate the income determination function. This study conducts separate panel data analyses of income determination functions: one including self-consumption and the other

The estimation results for equation (7) are summarized in Table 5. The estimated parameters of education, number of family laborers, and occupation are significantly positive for both equations. These findings suggest that the human capital of a household contributes to increases in household income.

Table 5. Income Determination Functions for Planggok and Somokaton

Dependent Variable	Household income excluding self-consumption		Household income including self-consumption	
	Independent variable	Total income Coefficient	Independent variable	Total income Coefficient
Constant		3743403 (6231638)		-1721001 (1.20e+07)
Education		791746.7*** (269480)		1249476** (524251.3)
Land		-255.5429 (269.4922)		-44.8086 (509.4528)
Asset		.6712403** (.3410208)		.2810015 (.6411852)
Family laborer		1902960*** (526866)		2912215*** (997587.6)
Damage		11507.59 (26499.59)		14237.74 (48866.87)
Rice prices		-4883.798* (2829.816)		-4172.81 (5246.081)
Occupation		2970719** (1436872)		7604590*** (2715097)
Fishpond		2064780 (1549615)		2292466 (2970257)
Age of household head		-99260.95 (63132.47)		-152067.8 (123816.1)
Family member		96715.53 (475552.4)		1204850 (940174.1)
<i>R-squared</i>		0.4157		0.3564
F-calculated		2.18***		2.01**
Wald chi2		53.17***		45.60***
Hausman test		0.8118		0.8959
Number of observations		156		156

*, **, and *** denote the significance levels 10%, 5%, and 1%, respectively; standard errors are in parentheses

The estimated parameter of assets is significantly positive only for household income when self-consumption of rice is excluded; it is insignificant for household income when self-consumption is included.

The price of rice has no effect on household income. On the other hand, it is significant at the 10% level for total income when self-consumption of rice is excluded. This implies that rice price increases have a negative effect on the marketed surplus of rice production, although rice price increases do not have any significant impact on household income.

Variable land, the percentage of damage in paddy cultivation, fishpond, household age, and number of family members do not affect the total income of households, as these are found to be insignificant.

CONCLUSION AND RECOMMENDATION

The estimation results of the income determination functions show that the price of rice had a negative influence on the marketed surplus of rice and did not have any significant impact on nominal household income. This indicates that if the price of rice decreases under trade liberalization, real incomes will increase, particularly for poor households who spend a large percentage of their income on rice cultivation.

This result is consistent with those of the previous studies (Warr, 2005; McCulloch and Timmer, 2008).

These results support the Indonesian government's policy to liberalize the country's rice trade. However, in order to conclude that the policy of liberalizing rice trade is better than the policy wherein the Indonesian government maintains control over the rice trade through the Bulog, it is necessary to carefully examine whether or not the following occur: an increase in rice production offsets the increase in rice consumption, rice price fluctuation does not affect the welfare of households, and the Indonesian government is no longer required to import more rice (for the role of the Bulog in ensuring food security, see Fane and Warr, 2008; Istiqomah et al., 2005;

Kajisa and Akiyama, op. cit.; Sidik, 2004; and Timmer, 2004).

1) For Central Java, we have some evidence to show that rice is a standard good (Christovao, et al., 2007).

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