

Determination of Rice Prices to the Welfare of Petani in West Sumatra Province



Lili Salfina¹, Zaki², Meirinaldi³, Sumarni⁴, Elsy Meida Arief⁵

^{1,2}Student University of Borobudur, Jakarta, Indonesia

^{3,4,5}Lecturers University of Borobudur, Jakarta, Indonesia

ABSTRACT: The study aims to analyze the influence of rice production, crop dry grain prices (GKP), rice consumption, per capita income and the number of people moderated by rice prices that impact on farmers' well-being. This research method uses a quantitative approach with panel data. The study was conducted in West Sumatra Province in 19 districts / cities with secondary data from the Central Statistics Agency (BPS) of West Sumatra Province in 2013 - 2019. Data analysis uses multiple line regression with panel data.

Simultaneous and partial research results found that rice production, crop dry grain prices (GKP), rice consumption, per capita income, and population can have a significant and positive effect on rice prices in West Sumatra province. While the impact of rice prices has a significant and negative effect on the welfare of farmers in West Sumatra province. The price of dry grain harvest (GKP) is the main factor that affects the price of rice, where rice consumption is a contributing factor that affects the price of rice. Meanwhile, rice production, per capita income and population, is a variable factor of disruption, because rice consumption is influenced by income / purchasing power and the number of family members, and in addition when viewed from the impact, the price of rice has a significant and negative effect on the welfare of farmers.

KEY WORDS: Rice production, Dry grain harvest prices, rice consumption, per capita income, population, rice prices and farmer welfare.

INTRODUCTION

At the moment globally, many countries are in crisis. One potential crisis that has a serious impact is the threat of a global food crisis. The issue of *world food crisis* closely related to the issue of global climate change and *global economic dynamics*, characterized by economic crises in developed countries and volatility in food and energy prices (Minister of Agriculture, 2012). This global problem must have an influence on domestic and local food security conditions, because currently no country can isolate itself from the world community.

Food is the most essential basic need for humans to sustain life. As a living being, without food man cannot live and live for life and society. In terms of meeting rice needs in Indonesia facing a dilemma between efforts to meet domestic consumption needs by increasing productivity and rice imports, with efforts to maintain the stability of rice prices to remain affordable by all parties. Rice demand in 2016 to 2019 decreased by 2.7 million tons per year or rice demand in 2013-2019 reached an average of 32.48. While rice offerings from 2016-2019 fluctuated.

Table 1. Rice Demand and Supply Data in Indonesia 2013 - 2019

Year	Population (000 people)	Demand Rice (millions of tons)	Rice Offerings (millions of tons)
2013	248.818	39.00	34.00
2014	252.165	34.50	34.50
2015	255.462	33.30	43.90
2016	258.705	32.30	29.18
2017	261.891	29.13	29.13
2018	265.015	29.57	33.94
2019	268.074	29.60	31.31
Average	220.293	32.48	33.70

Source: BPS Indonesia (2020)

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Based on the table above, seen the trend of the population is increasing, demand is not followed by the supply of rice that increases. This will certainly be a big mas, because the main food of the Indonesian population is rice. For West Sumatra, rice production, dry grain harvest price (GKP) and rice price are as seen in the table below:

Table 2. Production, dry grain prices and rice prices in West Sumatra Province 2013 - 2019

Year	Rice Production (thousands of tons)	GKP Price (Rp/Kg)	Price of rice (Kg)
2013	2.503,452	4.005,38	9.558,50
2014	2.519,020	4.300,95	11.712,50
2015	2.550,609	4.693,56	12.258,02
2016	2.503,452	4.617,26	12.789,53
2017	2.824,509	4.615,23	12.976,00
2018	1.483,076	4.893,82	13.087,00
2019	1.482,996	4.638,64	14.242,00

Source: Central Bureau of Statistics 2020 has been processed.

Based on the table above, it can be seen the difference in the price of dry grain harvest (GKP) with the price of rice per kilo gram is very much different. This is due to the increase in the price of Dry Grain Harvest (GKP) at the farmer level is a "trade off" for farmers. GKP that is too high causes traders or millers to be unwilling to buy it on the grounds that consumers' purchasing power of rice is low. In this condition, farmers' grain is threatened not to sell because the price is too high, on the other hand, the price is too low, making farmers lose money because the selling price cannot cover production costs.

To improve the welfare of farmers various types of production incentives for farmers have been provided by the government, including in the form of providing land and irrigation infrastructure, development of agricultural tools and machinery services (alsintan), input subsidies (fertilizers, seeds), interest subsidies on agricultural business loans, and other incentives (Simatupang and Rusastra 2004), including price policies. *output*. Structured *output* price policy began in 1967 in the form of basic price policy (HD) or floor price of grain and rice (Sawit 2001) which in subsequent years changed in accordance with the economic and political dynamics of national rice in its time. Starting in 2001, the *output* price policy changed from HD to the basic price of government purchase (HDPP), then to government procurement price (Suryana et al. 2001; BKP 2014a).

The price of rice on the market is one of the indicators that affects the per capita income of farmers. According to Mosher (1987), the most important thing about this income is the impact on the welfare of farmers, because some aspects of household welfare depend on income levels. The higher the household income, the percentage of income for food will be reduced. In other words, if there is an increase in income and the increase does not change consumption patterns then the household is prosperous. Conversely, if an increase in household income can change the consumption pattern, it is said to be not prosperous. Research on rice prices is Alan Dwi Wibowo et al., (2015), Nongnooch, Poramacom, (2014), Hezekiah Respatiadi and Hana Nabila (2018), Deby Ananda Difah et al., (2019), Yogi Makbul et al (2019) and Purbiyanti et al., (2017).

This study aims to find out the dominant factors in the determination of rice prices in West Sumatra from the selected variables, namely rice production, rice consumption, community per capita income and population. In connection with the determination of rice prices, it is studied how much the price of rice can affect the welfare of rice farmers.

LITERATURE REVIEW

The price of economic theory is determined by the intersection between the demand and supply of goods and services in the right. Thus the price of a good and the number of goods sold can be determined by looking at the state of balance in a market (Sukirno, 2013). While Suparyanto and Rosad (2015) stated that the price is a sum of money or something in other forms that has the necessary value to obtain a product. While Rahardja and Manurung (2006) explained the price of agricultural products with *teori Cobweb*. Cobweb theory is one of the applications of supply-demand analysis that explains why the prices of some agricultural and livestock goods show certain fluctuations from season to season and the cause of these fluctuations is the "late" reaction on the part of producers to prices (Budiono; 2014). According to Wawan Hermawan (2017) research; domestic rice prices are influenced by rice production, rupiah exchange rate, international rice prices and gdp per capita. While Yogi Makbul and Sudrajati Ratnaningtyas (2017) stated that the price of rice is integrated with the price of rice and Adeniyi, B. A et al., (2019) regarding determinants of rice price volatility. Besides that, the season also affects the price of rice, where in the dry season the rice harvest will be better when compared to the rainy season

Production is a process in which resources (inputs) are processed in such a way as to produce products (output) with greater added value than the previous form (Sukirno 2013). Millers and Meiners (2000) states that production is not only limited to its manufacture but also storage, distribution, transportation, repackaging, and repackaging or otherwise. Factors of production consist of land, labor, capital and skills, and in agriculture other factors that determine the results of production are also nature. The

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relationship between factors of production (input) and production output (output) is known as the production function. The production function that is often used is the Cobb-Douglas production function. Factors affecting production are carried out by Khairul Fahmi Purba *et al.*, (2020). I Made Yoga Prasada (2018) and Abdul Bashir and Saadah Yuliana (2018).

Consumption is the total expenditure to obtain goods and services in an economy in a certain period of time and to get these goods and services in need of income. While according to Mankiw (2013) consumption has the meaning of spending on goods and services by households. John Maynard Keynes in 1930 proposed the theory of consumption that the amount of consumption today is directly related to income. The small amount of consumption carried out is very dependent on income, so it is said that consumption is a function of income (consumption = f (income)). Menurut Sadono Sukirno (2013) the determinant in consumption activities is the benefits that have been collected, sku bunga, sku frugal, economic economy, distribusi income and not sufficient funds. The results of Rahmasuciana's research, *et al.*, (2015) stated that per capita consumption is influenced by rice prices, per capita income, and consumer preferences. While A. Husni Malian *et al.*, (2004); Rising rice prices will affect household consumption. While Imam Asngari (2020) and Corryati Wardani (2019) reviewed rice consumption.

Per capita income is the average income of the population of a region in a certain period that is usually one year (Sukirno, 2013). While Jhingan (2007) states that per capita income is the result of sharing between regional income on a constant price basis (ADHK) with a mid-year population. Per capita PDRB can be viewed on the basis of prevailing prices as well as on the basis of constant prices. Per capita is often used as a measure of the prosperity and level of development of a country or region or determinant of the economic state of a country. According to Kamil Maitah *et al.*, (2020) rice as a determinant of economic sustainability.

Population is the main resource that has a major influence on development in a region based on the Population Reference Bureau (PRB) (2011). And according to BPS (2020), penduduk is all people who are domiciled in the territory of the Unitary State of the Republic of Indonesia for 1 year or more or those domiciled less than 1 year but aim to settle. Based on Malthus' theory, population growth according to the series of measurements and economic growth according to the series of calculations, means that the population will grow faster than economic growth (Edmund Conway, 2015).

Community welfare is a number of satisfactions obtained by a person from the results of consuming income received, but the level of welfare itself is something that is indicated because it depends on the amount of satisfaction obtained from the results of consuming that income. With regards to agriculture, then what is seen is the welfare of farmers. According to Sudana *et al.*, (2008), the welfare of farmers was analyzed using five indicators, namely (1) household income structure (onfarm, off farm, and non farm), (2) Household expenditure structure, (3) Household food subsistence level, (4) Farmer household purchasing power level, and (5) Farmer Exchange Rate (NTP). Nevertheless, this study only conducted an analysis of farmers' exchange rates (NTP). While Ruauw (2010) in his research discusses about the welfare of farmers is with the Farmer Exchange Rate (NTP). The level of welfare of farmers' households can be approached by the concept of Farmer Exchange Rate (NTP) which is the ratio of the price index received and the index of prices paid by farmers. The farmer's household income exchange rate (NTPRP) is as follows:

$$NTPRP = \frac{Y}{E} \quad Y = YNP + YP \quad E = EP + EK$$

Where:

YP = Total exposure from agricultural business

YNP = Total Revenue from non-agricultural businesses

EP = Total expenditure for agricultural businesses

EK = Total expenditure for non-agricultural businesses

The results of research from Emily Schmidt (2020) stated that the price of rice induced by Covid 19 has an impact on the welfare of the community.

METHODS OF RESEARCH

The method of data analysis in this study is descriptive and verifiative analysis. Verifiative analysis in this study uses regression analysis of panel data (pooled data). Data panel is combining cross sectional data with time series. Cross sectional data is the number of districts and cities in West Sumatra Province and Time Series is the time period from 2013 to 2019. The data processing tools in this study used Microsoft excel and Eviews 10 software. Regression determination is done through the stages of determining the estimation model (Pooled OLS / Common Effect, Fixed Effect and Random Effect) by means of the F (Tast Chow) test, Hausman test, and Lagrange Multiplier test. The next step is the F test hypothesis, and the t test and coefficient of determination. A frame of mind formed based on the following images:

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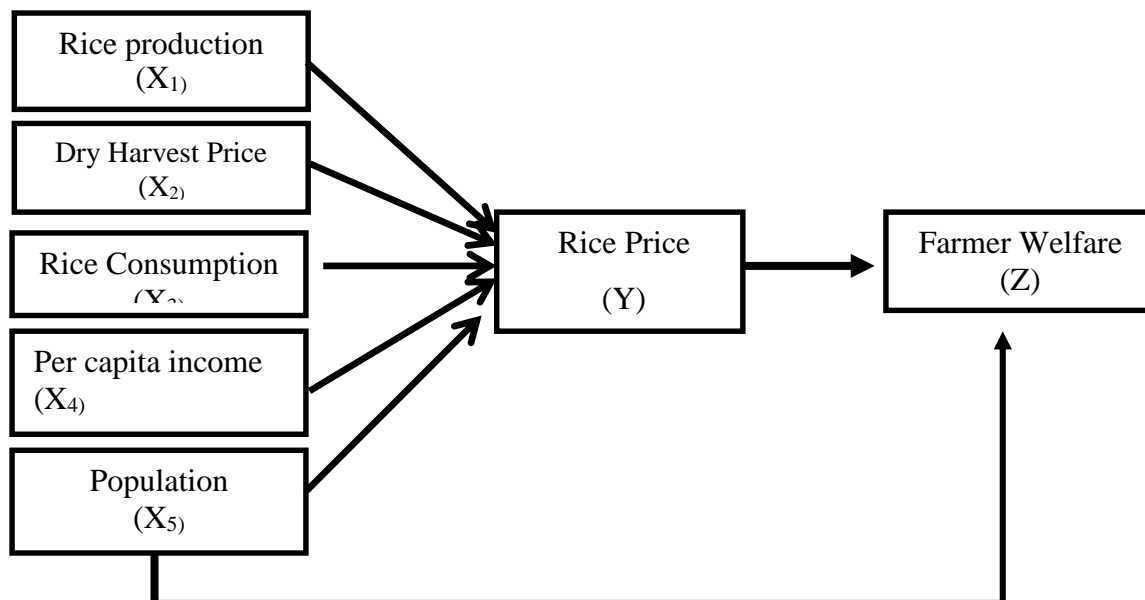


Figure 1. Research Scheme

Based on the above frame of mind, two equations are obtained as follows:

Equation 1: The effect of rice production, the price of dry grain harvest, rice consumption, per capita income and the population on the price of rice.

$$Y_{it} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon_{it}$$

Where:

Y_{it} = Price of rice

α = Constant

β = Regression coefficient of each independent variable

X_1 = Rice production

X_2 = Price of dry grain harvest

X_3 = rice consumption

X_4 = income per capita

X_5 = population

ε = Error term

t = Time

i = Regency/city

Equation 2: The price of rice has an impact on the welfare of farmers.

$$Z_{it} = \alpha + \beta Y_{it} + \varepsilon_{it}$$

Where:

Z_{it} = Farmer Welfare

α = Constant

β = Regression coefficient

Y_{it} = Price of rice

RESULTS AND DISCUSSION

Geographically, West Sumatra Province is located between 98o 36'-101o 53' East Longitude and 0 o 54' North Latitude up to 3o 30' South Latitude, with a land area of + 42,297.30 Km² and water area (sea) + 51,060.23 km² with a land area coastline length + 375 Km plus the length of the Coastline of the Mentawai Islands + 1,003 so that the total overall coastline + 1,378 Km. These sea waters have 185 large and small islands. Administratively, West Sumatra Province consists of 19 regencies / cities (12 regencies and 7 cities) which have 179 sub-districts with 259 villages and 760 nagari, with the following boundaries: north with North Sumatra province, east with Riau and Jambi provinces, south with Bengkulu province, and west border with the Indian Ocean according to rpjmd information from West Sumatra (2009 - 2029).

The hydrological condition of West Sumatra Province has considerable water resources when viewed from the number of rivers and lakes. The number of rivers in West Sumatra Province reaches 606 rivers that partly empties into the Indian Ocean on the

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West Coast and partly towards the East Coast of Sumatra Island. West Sumatra area that is fed by this river can be divided into 9 Units of River Region (SWS) namely SWS Akuaman, Siberut Island, Natal-Batahan, Kampar, Batang Hari, Silaut, Rokan, Indragiri and Masang. The source of the river water comes from mountains and lakes (Lake Above, Lake Below, Lake Maninjau and Lake Singkarak). Lake Singkarak located in Solok regency and Tanah Datar has an area of 13,011 km², Lake Maninjau is located in Agam Regency has an area of 9,950 km², while Lake Above (3,150 km²), Lake Below (1,400 km²), and Lake Talang (1.02 km²) are found in SolokRegency.

West Sumatra consists of 12 regencies and 7 municipalities. Those included in the district include K. Mentawai, South Coast, Solok Regency, Swl / Sijunjung, Tanah Datar, Padang Pariaman, Agam,50 Kota, Pasaman, Solok Selatan, Dhamasraya, West Pasaman. While the municipalities are Padang, Solok, Sawah Lunto, Padang Panjang, Bukit Tinggi, Payakumbuh and Pariaman.

Based on the test results in determining the best model is *the Fixed Effect* shown by the results of processed eviws 10 as follows:

Table 3.

Dependent Variable: LOGY
 Method: Panel Least Squares
 Date: 03/07/21 Time: 16:12
 Sample: 2013 2019
 Periods included: 7
 Cross-sections included: 16
 Total panel (balanced) observations: 112

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.377946	0.352267	18.10544	0.0000
LOGX1	0.053930	0.003161	17.06218	0.0000
LOGX2	0.092173	0.033329	2.765557	0.0069
LOGX3	0.091974	0.041299	2.227018	0.0284
LOGX4	0.055198	0.015192	3.633450	0.0005
LOGX5	0.057676	0.005338	10.80420	0.0000
R-squared	0.969899	F-statistic		146.6062
Adjusted R-squared	0.963283	Prob(F-statistic)		0.000000

Source: in olah with eviws 10

Equation: 1 is:

$$\text{LogY} = 6.377946 + 0.053930 \log X_1 + 0.092173 \log X_2 + 0.091974 \log X_3 + 0.055198 \log X_4 + 0.057676 \log X_5 + e_i$$

Equation 1 above can be interpreted that:

- Constant a of 6.377946 states that if the value of variables X₁,X₂,X₃,X₄,X₅ is constant (0) then the variable value Harga rice (Y) is 6.377946 and the relationship that occurred is positive and significant.
- The regression coefficient value X₁ (rice production) has a positive relationship to the price of rice with the value of the beta coefficient = 0.053930 meaning that every 1% increase in rice production, then the price of rice (Y) will increase by 0.054%, nature this other factor is considered fixed and the relationship that occurs is significant.
- The regression coefficient value X₂ (Price Gabah Kering Petani) has a positive relationship with the price of rice with a beta coefficient = 0.092173 meaning that every increase of 1% X₂, then the price of rice (Y) will increase by 0.092%, nature this other factor is considered The relationship and the relationship is significant. The price of dry grain harvest (GKP) is the main factor affecting the price of rice addressed by the beta coefficient of 0.0922.
- Regression coefficient value X₃ (Rice consumption) has a positive relationship with the value of the beta coefficient = 0.091974 meaning that every 1% increase in rice consumption, then the price of rice (Y) will increase by 0.0920%, nature this other factor is considered fixed and the relationship that occurs is significant. Kounces of rice is a contributing factor that affects the price of rice after the price of dry grain at the farmer level.
- The regression coefficient value X₄ (per capita income) has a positive relationship of 0.055198 which means that every increase of 1% per capita income, then the price of rice (Y) will increase by 0.055%, nature this other factor is considered fixed and the relationship that occurs is significant.

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- The regression coefficient value X5 (Population) has a positive relationship of 0.057676 which means that every change of 1% of the population, then the price of rice (Y) will decrease by 0.058%, and nature this other factor is considered fixed and the relationship that occurs is significant.

Hasyl test f (simultaneous influence) on equation 1 is rice production (X1), dry grain harvest price (X2), rice consumption (X3), per capita income (X4) and population number (X5) is significant and positive the price of rice with a Prob (F-statistic) value of 0.0000. And the Coefficient of Determination is expressed in the form of *Adjusted R-Squared* results of 0.963283 which means that rice production, dry grain harvest prices, rice consumption, per capita income and population together have an effect of 96.3% on rice prices. 3.7% was influenced by other factors that were not included in the study. In addition, the form of variable relationship X (rice production, dry grain harvest price, rice consumption, per capita income and population) to the price of rice (Y) is in elastic (elasticity < 1), this relationship states that the large treatment of variable X (rice production, dry grain harvest price, rice consumption, per capita income) and the population) has only a small impact on the price of rice (Y).

Based on the test results in determining the best model is *the Fixed Effect* shown by the results of processed eviws 10 as follows:

Table 4. Model Panel Data Regression Results 2

Dependent Variable: LOGZ1
 Method: Panel Least Squares
 Date: 03/07/21 Time: 16:22
 Sample: 2013 2019
 Periods included: 7
 Cross-sections included: 19
 Total panel (balanced) observations: 133

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	7.281212	0.068390	106.4665	0.0000
LOGY	-0.285290	0.007255	-39.32273	0.0000
R-squared	0.931898	F-statistic		81.38299
Adjusted R-squared	0.920447	Prob(F-statistic)		0.000000

Source: Output Eviews Statistics Version 10

The 2nd equation in this study is

$$\text{Log Z} = 7.281212 - 0.285290 \log Y$$

The form of equation obtained from the selection of models that have been done chow test, Hausman test and Lagrange Multiplier test is a Random Effect model. From the results of the equation obtained the following:

- Constant (α) of 7,281212 states that if the Price of Rice (Y) does not undergo treatment then the variable value of farmer welfare (KP) is 7,281212.
- The regression coefficient value Y has a negative relationship with a beta coefficient of 0.285290 which means that every 1% increase in the price of rice (Y), then the welfare of farmers (Z) will decrease by 0.29%, in which case other factors are considered fixed.

The effect of rice prices (Y) on the welfare of farmers (Z) is negative and significant, while the magnitude of the effect of rice prices (Y) on the welfare of farmers (Z) is shown by the results *adjusted R-Squared* is 0.931898. This means that 93.1% of the variable rice price (Y) affects the welfare of farmers, while the remaining 6.9% is influenced by other variables outside the study variable. The form of relationship between rice prices and the welfare of farmers is elastic which means that large changes to rice prices have only a small impact on the welfare of farmers (the price of rice at the high consumer level causes a decrease in farmers' welfare to decrease, although the decrease is not as big as the increase in rice prices).

CONCLUSION

In West Sumatra the price of rice is an dilemma, because it must be a farmer or rice consumer. The price of rice will affect the level of wisdom of farmers. This study tried to observe the influence of rice prices and their effect on the welfare of farmers in 12 regencies and 7 municipalities in West Sumatra.

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The results stated that all the variables used in this study had a positive and significant effect on the price of rice, although the effect was inelastic. In addition, the price of rice with a negative and significant level of farmer welfare which means that the increase in rice prices has an impact on the decrease in the level of farmer welfare.

In connection with the results of research, the increase in rice prices at the consumer level has a negative influence on the welfare of farmers. This contradicts existing theories, where the price of rice at the consumer level is determined by the price of dry grain at the farmer level. One of the causes of the decline in the level of welfare of farmers is the increase in rice prices at the consumer level is much higher than the price of dry grain at the farmer level. In addition, price increases at the consumer level can lead to inflation. And this is what causes the level of welfare of farmers to decline. According to Deby Ananda Difah (2019); the widening price of rice at the farmer level and the retail price of rice indicates an asymmetrical vertical price transmission.

The improvement of farmers' welfare by the Regional Government of West Sumatra Province is carried out by ensuring price stability and increasing rice production through guaranteeing food availability by protecting farmers from rice imports, encouraging increased rice production domestically, maintaining the availability of irrigation and agricultural inputs, strengthening the availability of foodstuffs to meet population consumption in West Sumatra province, in addition to doing so. Rice price policy that favors farmers.

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