The Determinant Factors Of Rice's Marketed Surplus in Bone Bolango Regency

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ABSTRACT

The smallholder farmers and farm land size ownership are problems that have an effect to farmer's rice production and be a part to determine a marketing producer's surplus. Particularly, marketed surplus is the grand theory of producer's surplus which is explained in this research. The purpose of this study is to examine and analyze the determinant factors of rice marketed surplus in Bone Bolango regency. The study was conducted purposively in Bone Bolango regency with stratified sampling technique as sampling collected method. Multiple Regression Analysis with BLUE (Best Linear Unbiased Estimator) are used as data analysis method. The results showed that rice's marketed surplus and off-farm income are significant and positive determine rice's marketed surplus whereas the farmer loan has significant affect within negative sign. Nevertheless, farm size, Number of family members and consumption has not significant effect to rice's marketed surplus in Bone Bolango regency.

Keywords: marketed surplus, producer's surplus, rice marketing, rice's marketed surplus

INTRODUCTION

The theory of Thomas Malthus stating that population growth tends to increased faster than food production and effected to short supply of food necessities. This theory should be an important warning to keep food supply availability which as the basis for fulfilling people's food needs. This population growth issue has been one of a highlight issues in Indonesia. National Census data in (1970-2008) which states in Subejo at 2014 noted that the National population increased to 100 million and continued to experience a significant increase in over 40 years until the end of 2007. As the national issues, population growth in Bone Bolango regency shows the same growth pattern. Central statistic organization noted that Bone Bone Regency had 139.32 thousand numbers population in 2009 and continued to increase to reach 150.39 thousand in 2013 (BPS, 2014).

The government needs to keep availability of staple food such as rice as the solution to deal with population growth problem. The main goals of national rice policy are to keep national rice supply stability, prices stability and increase farmer welfare (Darwanto, 2014). In any case, farmer's land ownership is the real obstacle to keep rice supply stability.

Bone Bolango regency has many smallholders farmers. Agriculture Survey in 2003 showed that smallholder farmers who holds less than 0.50 hectares (5,000 m^2) of land dominates the number of farmer households in Bone Bolango regency. Furthermore, Agriculture Survey in 2013 had some pattern as before noted that farmers who holds less than 0.10 hectares (1,000 m^2) is as many as 5,314 households, and has increased 13.89 per cent compared to the 2003

agriculture survey results (BPS, 2013). Based on fact, rice farmers in Bone Bolango regency are still classified as smallholder farmer.

Farmer's land ownership has an indirect effect to production then determined a producer's surplus. As said in Tuteja (2013), in the marketing point of view, producer's surplus is one of the most important concepts. Producer's surplus is defined as the quantity which is actually made available to the non-producing population of the country. Moreover, the grand theory of marketed and marketable surplus are the particularly theory of producer's surplus that are explained in this research.

As said in (Kumar, 2013), Marketable surplus is a theoretical concept which represents the surplus which the farmer/producer has available with himself for disposal once the genuine requirements of the farmer for family consumption, payment of wages in kind, feed, seed and wastage have been met. It is the portion of a harvest that a farmer can sell to the market to earn a profit. While, marketed surplus refers to that part of the marketable surplus which is actually marketed by the producer.

The recent study doing by Mashuri in 2014 has focused the research to analyze rice's marketable surplus. It states that the marketable surplus was influenced by rice's production, rice seed, price of pesticides, total income, food expenses, land holding, age of farmers, number of family members, number of rice field blocks and system of irrigation. In addition to research doing by Jabbar in 2010, this research more focused on empirical estimation of marketed surplus and it states that the concept of marketed surplus are defined by gross marketed surplus, net marketed surplus and marketable surplus. In another study in 2011 that is explained by Borate took the concept of marketed and marketable surplus in one analyzed data. The results showed that marketable surplus was positively and significantly related with cropped area and average, while in case of marketed surplus revealed that marketed surplus was positively and significantly related with total production, current price sand financial obligation. On the other hand, according the recent study, this research goal is to explain the determined factor of rice's marketed surplus in the specific case in Bone Bolango regency.

METHODOLOGY

The study was conducted purposively in Bone Bolango Regency, Gorontalo Province. This research data is primary data form 131 sample respondent that were collected by probability sampling method with stratified sampling technique. Based on this method, five sub-districts which had the largest number of rice farm households were deliberately selected as observation samples areas, then two villages were selected in each sub-district as the last strata in the sampling.

The basic data analysis method was statistic parametric analysis. Hence, to analyze the determinants factors of marketed surplus in Bone Bolango Regency, Multiple Regression Analysis with BLUE (Best Linear Unbiased Estimator) are used as data analysis method. Regression analysis is concerned with the study of the dependence of one variable, the dependent variable, on one or more other variables, the explanatory variables, with a view to estimating and/or predicting the (population) mean or average value of the former in terms of the known or fixed (in repeated sampling) values of the latter (Gujarati,2004). The marketed surplus regression analysis model used is as follows.

$$Y= \beta_0+ \beta_1X1+ \beta_2X2+ \beta_3X3+ \beta_4X4+ \beta_5X5+ \beta_6X6+\mu_i$$

Where:
Y = Marketed Surplus
X_1 = Farm Size
X_2 = Rice's Production
X_3 = Off-farm Income
X_4 = Number of family members
X_5 = Consumption
X_6 = Farmers Loans
β_0 = Constanta
$\beta_{1...}$ β_{10} = Coefficient of Regression

The method that used to estimate the models is Ordinary Last Squared (OLS) method. The Dependent variable (Y) is marketed surplus, while the independent variables are farm size (X1), rice's production (X2), off-farm Income (X3), number of family members (X4), consumption (X5), and farmer loans (X6).

First, classic assumption with Ordinary Least Square (OLS) tests were performed before estimating the regression model. This test purpose is to ensure that the OLS estimator of the regression coefficient is an unbiased estimator, linear, and has a minimum variant BLUE (Best Linear Unbiased Estimator), so that the coefficient estimation obtained is significant and effective (Gujarati, 2004). This test includes normality test, multicollinearity test, heteroscedaticity test and autocorrelation test. Furthermore, to estimate the marketed surplus regression model, the goodness of fit model is performed by testing partial and simultaneous, as follows:

a) Coefficient determination (R-squared): R-squared is also known as the coefficient of determination, or the coefficient of multiple determinations for multiple regressions. R-squared is a statistical measure of how close the data are to the fitted regression line. R-squared is always between 0 and 100%. The higher the R-squared (as much as closed to 100%) indicates that the model explains all the variability of the response data around its mean or the better the model fits the data.
b) F statistics test: This test is performed to show the simultaneous influence of all explanatory variables to dependent variables in the regression model. If the probability of t-statistics value of F-statistic < α (0,05): Rejected Ho, it means that all independent variables tested have an effect on the dependent variable simultaneously. Moreover If the probability of F-statistic > α (0,05): Accept Ho, it means that all the independent variables tested do not have simultaneous affect to the dependent variable.
c) T statistic test: The t-test is also known as individual or partial test that is used for examine the individual determination of explanatory variable to dependent variable. If the probability of t-statistics value < α (0,05): Rejected Ho, it means that the variable tested has a significant determination to dependent variable. Moreover, If the probability of t-statistics value > α (0,05): accepted Ho, it means that the variable tested has no significant determination to dependent variable.

RESULT AND EXPLANATION

1. The BLUE Assumption of Classical Regression Models

1.1 Autocorrelation Test

Autocorrelation test are used to find the existence of correlation symptoms between variables observed by previous data. In this study, autocorrelation test performed with the software Eviews 7, which was identified by *Breusch-Godfrey Serial Correlation LM Test*. The value of probability of t-statistics of Obs*R-Squared > α (0,05) shows that the data has no autocorrelation. Autocorrelation test result is as follows.

Table 1: The Result of Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.260784	Probability of t-statistics	0.2871
Obs*R-squared	**2.653820**	**Probability of t-statistics**	**0.2653**

Sources: Analysis of primary data, 2018

Based on result which is pictured in table 1, the probability of t-statistics Obs*-′squared value was 0,265 and it was bigger than α (0,05). It can be inferred that there was no autocorrelation problem in the regression models.

1.2 Heteroscedasticity Test

Heteroscedasticity is a condition which the variant of X was not constant. It was happened because there was unstable data fluctuation wihich is denote with E (ei) = $\sigma i^{2.}$. The existence of heteroscedasticity on regression model makes the standard error value could not be believed anymore. The impact of unbelievable standard error is an error F-test and T-test result estimation. Therefore, before the regression models estimated, it should be on homoscedasticity condition. Homoscedasticity was a desired condition in multiple regression which is all the variant X were constant and positive, it was denote by E (ei) = σi^2

In this study, heteroscedasticity test was performed with the software Eviews 7, which was identified by *White Heteroscedasticity Test.* The existences of heteroscedasticity was identified by The value of probability of Obs*R-Squared > α (0,05), it means the data was homoscedascity. Heteroscedasticity test done by White Test and showed the results as follows:

Table 2: The Result of *White Heteroscedasticity Test* :

F-statistic	1.768611	Prob. F(6,123)	0.1110
Obs*R-squared	10.32482	Prob. Chi-Square(6)	0.1116
Scaled explained SS	133.7398	Prob. Chi-Square(6)	0.0000

Sources: Analysis of primary data, 2018

Based on *White Heteroscedasticity Test* the probability of Obs*R-Squared was 0,116, it means the data on regression models has no heteroscedasticity problem. So that the F-test and T-test result estimation can be the best estimator.

1.3 Multicollinearity Test

Multicollinearity is a condition in which two or more predictor variable (X) in multiple regression are highly correlated each other. In seriously case of multicollinearity, regression coefficients showed no pure effect of the independent variables in the models.

Multicollinearity test was done by looking at the value of VIF (Variant Inflation Factor). If the VIF Value of each variable were observed > 10 supposedly there was a relatively serve multicolinearty problem (Gujarati, 2004). Multicollinearity Test Using SPSS can be seen initable 3.

Table 3: The Result of *Multicollinearity Test* :

Variable	Collinearity Statistics	
	Tolerance	VIF
Farm Size	0.795	1.258
Production	0.673	1.485
Off-farm Income	0.912	1.096
Numbers of Famly	0.928	1.078
Consumption	0.727	1.376
Farmers Debts	0.813	1.229

Sources: Analysis of primary data, 2018

Table 3 shows all the independent variables has a value of VIF <10, which means the models all free of multicollinearity problem.

2. Regression Analysis Result

Multiple regression method has been used to analyzed the influenced of explanatory variable to dependent variable. Furthermore, regression analysis also explain about how much the influenced of individual explanatory variable to dependent variable. In this study, the regression model was used to explain how much the independent factors such as farm size, rice's production, off-farm income, Number of family members, consumption, and farmer loans determined the dependent factor namely rice's marketed surplus in Bone Bolango regency, and the result of analysis shows as follows:

Table 5: The Result of Multiple Regression Analysis of Rice's Marketed Surplus Determinant Factors

Variable	Coefficient	t-Statistic	t- Probability of t-statistics	Decision
Constanta	-2.393470	-3.300157	0.0013	
Farm Size	0.071318	1.109717	0.2693	Not significant
Rice's Production	1.410627	15.60296	0.0000	significant
Off-farm Income	0.059747	-2.496707	0.0139	significant
Number of family members	-0.149871	-0.998522	0.3200	Not significant
Consumption	-0.149331	-1.601077	0.1119	Not significant
Farmers Loans	-0.174037	-5.162728	0.0000	significant
R-squared	0.736898			
Adjusted R-squared	0.724064			
S.E. of regression	0.512619			
Sum squared resid	32.32177			
Log likelihood	-93.99544			
F-statistic	57.41649			
Prob(F-statistic)	0.000000			

Sources: Analysis of primary data, 2018
Notes : significant at α = 0,05

Based on regression analysis result, the rice's marketed surplus regression model was as follow:

$$\mathbf{Y=-2.393470 + 0.071318X1+1.410627X2+0.059747X3-0.149871X4 -0.14933X5 -0.174037X6+ \mu_i}$$

In the regression model, marketed surplus was taken as dependent variable, while farm size, rice's production, off-farm income, number of family members, consumption, and farmer loans were taken as explanatory variable. It has been observed that the R^2 value for marketed regression models was more than 0,73 indicating thereby more than 73 per cent variation of rice marketed surplus was explained by the factor under considerations. Whereas, the rest of 27 per cent was explained by the other factor which was not include in the regression model.

The result of multiple regression analysis of rice's marketable surplus determinant factor that is shown in table 5, were also explain about the result of F-test. It has been observed that the probability of F statistic value was 0,00 and it does less than significant value α (0,05). It is clear explained that all explanatory variables were simultaneous determine the dependent variable. The explanatory variable suggested were farm size, rice's production, off-farm income, number of family members, consumption, and farmers loans.

Furthermore, the examination of individual determinant factor to marketable surplus has been observed by t-test result. Then, the individual determination factors to marketed surplus are specifically explained as follows.

The first explanatory variable namely farms size (X1). It has probability of t-statistics value (0,26) which is high than α value (0.05). It is indicated that farms size variable has insignificant influenced to rice's marketed surplus. In addition to coefficient regression in the model, farm size variable has a positive sign with a value of 0.07. It means that is 1 per cent increasing value of farm size increase 0.07 per cent of rice's marketed surplus. Although the coefficient regression of farm size has a positive sign, but it only has less than 1 per cent effect on rice's marketed surplus in Bone Bolango regency. It explains the reason why this variable has insignificant effect to rice's marketed surplus.

The second explanatory variable that is rice's production (X2) has probability of t-statistics value (0.00) which is smaller than α value (0.05). It is indicated that rice's production variable has significant influenced to rice's marketed surplus. Then, the positive sign of coefficient regression with 1.47 indicates that is 1 per cent increasing value of rice production will increase 1.47 per cent of rice's marketed surplus. Above all, total rice production gives positive direct significant effect to rice marketed surplus. In the same way, the large amount of rice production in Bone Bolango makes the greater potential to the farmers to sell their production in the market because farmers still have more rice surplus after fill their daily needs.

Similarly with rice's production variable, the off-farm income has positive and significant effect to marketed surplus. It has 0.013 t-statistics probability that is smaller than α value (0.05) and has negative sign with 0,05 coefficient regression value. This means that 1 per cent increasing value of off-farm income will increased 0,05 per cent of marketed surplus. Alternatively, off-farm income helps farmers to get cash money to cost their daily needs. It means that farmers would not take their rice production to cover their daily needs whether for consumption or farming capital in the next period. Hence, the condition increased the proportion of rice production to be marketed.

In any case, Number of family members (X4) has no significant effect and negative sign of coefficient regression. The coefficient regression value is -0.14 that is indicated 0,14 per cent decreasing value of marketed surplus was caused by 1 per cent increasing of number of family members. The bigger Number of family members leads a live high cost especially to the rice farmers. Then, it makes a negative effect to rice marketed surplus. However, most of rice farmers in Bone Bolago have small family number, so that this factor has no significant effect to Bone Bolango's rice marketed surplus.

In the same way, consumption variables (X5) also has insignificant effect and negative sign of coefficient regression. The coefficient regression value is -0.14 that is indicated 0.14 per cent decreasing value of marketed surplus was caused by 1 per cent increasing consumption value. The consumption variable itself is the part of rice production that farmers use to supply their self-consumption. When the supply of farmer's rice self-consumption increase then rice marketed surplus proportion tends to decline. However, this factor has no significant effect on the rice marketed surplus in Bone Bolango regency, because of most farmers has preferred to sell the rice production and makes repurchase the rice in that sell in the market to supply their self-consumption. Although, there are farmers that preferred to fulfill their rice self-consumption needs which take from their own rice production, namely small farmers.

The last variable namely farmer loans (X6). It has probability of t-statistics value (0,00) which is smaller than α value (0,05). It is indicated that farmer loans variable has significant influenced to rice's marketed surplus. Then, the negative sign of coefficient regression with 0.17 value indicates that 1 per cent increasing value of farmers rents will decrease 0.17 per cent of rice marketed surplus. The statistical results of the regression model explained real condition of rice's farmer problem in Bone Bolango regency. Most of the farmers in Bone Bolango are small farmer who has been depends on on-farm income not only to cost their daily needs but also to cost their farming process. This problem causes the farmers run out of capital to costs their farming in the next period. Consequently, farmers need the loan to fill their next rice farming. Most of the rice's farmer loan in Bone Bolango regency has been provided by rice milling business. Furthermore, the larger loan that farmer has, the more rice production will be used to pay the loan and the smaller proportion of rice production to be marketed.

CONCLUSION AND POLICY IMPLICATION

In the first place, all explanatory variables that consist of farm size, rice's production, off-farm income, number of family members, consumption, and farmer loans were simultaneous determine the dependent variable namely rice's marketed surplus. Therefore, more than 73 per cent variation of rice marketed surplus was explained by the factor under considerations.

Secondly, The t-test result revealed that rice's production (X2) and off-farm income (X3) have significant and positive effect to marketed surplus whereas farmer rents (X6) have significant affect within negative sign. In the other hand, the farm size (X1) has positive but insignificant determination and number of family members (X4) and consumption (X5) have insignificant effect to marketed surplus.

Lastly, The factors that have significantly determined to rice's marketed surplus in Bone Bolango regency need to have more concerned by the government. The government needs to improve agricultural programs in order to increase the total rice production that has significant and positive effect to increased rice's

marketed surplus. The farmer expectation is government policy not only focus on improving agricultural factors production facilities but also pay attention to the conditions when farmers get failed crops time. Hence, they needs such a agriculture policy that improve the performance of agricultural insurance programs . It can be one solution to keep marketed rice's surplus stable even in crop failure time. Above all, the government program also needs to take a big part in providing rice farming capital in Bone Bolango regency, so that farmers will not be trapped in lending to unofficial financial institutions such as moneylenders or even relying on capital from the rice milling business.

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