# THE IMPACT OF THE COMBINATION OF GOVERNMENT PURCHASE PRICE POLICIES ON THE WELL-BEING OF RICE FARMERS IN CENTRAL SULAWESI

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**ABSTRACT**

This study aims to analyze the impact of a combination of government purchase price policies on the welfare of rice farmers during various simulation periods in Central Sulawesi. The data used in this research is the type of time series 1971-2018. Data analysis is proxied using an econometric model, which is built in the form of a system of simultaneous equations. The equation consists of 22 endogenous variables and 26 exogenous variableswith a lag of 14 variables. Furthermore, the model is estimated by the method2SLSand historical simulations for the period 1972-1980 (HDG), 1981-2001 (HDGB) and the period 2002-2018 (COGS).The results showed that the combination of government purchase price policies in all scenarios and simulation periods had a positive impact on changes in producer surplus. In the HDG period, the change in producer surplus was Rp 1.30-1.36 billion, in the HDGB period it was Rp.2.17-3.42 billion and in the HPP period it was Rp.3.76-17.56 billion. In addition, the combination of these policies actually harmed consumers, which was marked by the negative value of the consumer surplus, where the highest consumer losses were in the HPP period, namely Rp. 7.15-64.65 billion. Therefore, the instrument for combining the HPP policy with other production inputs is maintained to ensure a real increase in farmer welfare.

***Keywords: Combination of policies, government purchase prices, producer surplus, consumer surplus, welfare of rice farmers***

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## PRELIMINARY

Increasing rice production is the focus of national development in the agricultural sector. This is done because (1) rice is the staple food and the main source of calories, (2) most of the Indonesian population has a livelihood in the agricultural food crop sector, and (3) has the largest share in the consumer price index which is an indicator measuring economic stability. . To increase rice production and productivity, the government issued a policy of subsidizing production facilities, namely subsidizing fertilizer prices. However, along with the introduction of free trade, the fertilizer subsidy was removed. This has an impact on increasing the burden on farmers in farming.

An increase in fertilizer prices will have an impact on decreasing demand for fertilizer input by farmers, which in turn will have an impact on decreasing production, and rice productivity will reduce rice supply. To overcome this, the government issued a government purchase price (HPP) policy aimed at covering high farmer expenditures due to rising fertilizer prices. The HPP policy is an important instrument in creating national food security. The grain price policy is ineffective if it is not followed by other rice policies. Low price policy is not recommended, because empirical evidence shows that this policy has tormented rice farmers and was unable to encourage the industrial sector to compete in the world market.

In general, one of the problems with rice demand in Indonesia is that the price of rice is relatively high and tends to increase every year. This condition also occurs in Central Sulawesi Province, where the problem of rising rice prices economically is a matter of supply and demand. This is as stated by Hutauruk (1996); Septiadi, et al. (2016) and Rifiana and Budiwati (2019) stated that the harvest area is responsive to the basic price of rice and the price of rice in the long term. To reduce rice prices, the government must maintain prices that are directly correlated with production costs and ensure farmers' profits. This can be realized if Bulog buys unhulled rice directly from farmers.

In Central Sulawesi Province, it shows that in the period 2004-2018, the farmer-level unhulled rice price (HGTP) was higher in value than the government purchase price (HPP), while the retail rice price (HBE) tended to increase. In 2004, the amounts of HPP, HGTP, and HBE in Central Sulawesi were IDR 1,230, IDR 1,725 and IDR 2,963, respectively. In 2011 each amounted to IDR 2,640, IDR 2,640, IDR 7,015, and continued to increase until 2018 amounting to IDR 3,700, IDR 5,010, and IDR 11,800 respectively (BPS, 2004-2018). This condition shows that government policies have not had an impact on improving the welfare of farmers because the government buys less harvested dry grain compared to middlemen.

In this study, the welfare of farmers is proxied by the approach of changing the aggregate surplus value of producers. A producer surplus is a benefit received by farmers when the equilibrium price is higher than the lowest price that farmers are willing to accept to produce production (Akhmad, 2014). This approach is also used in the research results of Putri, et al., (2013) and Siswanto, et al., (2018), where if the change in producer surplus is positive, it shows that farmers receive more benefits (profit) in farming. Vice versa, if the sign is negative the farmers experience losses.

In addition to the HPP increase policy, the policy to increase the price of fertilizers, intensification area, and irrigation area are also important government instruments in order to achieve farmer welfare and independence. To compensate for the partiality of farmers, the government has also implemented instruments to increase import tariffs and intervene in exchange rates. This is done as a government effort to protect consumers. From these various policy instruments, it is hoped that a combination of policies can significantly improve the welfare of farmers. Based on this description, the main objective of this study is to analyze the impact of the combined government purchasing price policy on the welfare of rice farmers.

## RESEARCH METHODS

The data used in this research is secondary data type with time series type. Time series data or time series are used, namely for 48 years (1971 to 2018) in aggregate. The research data is sourced from the Central Statistics Agency (BPS) of Central Sulawesi Province and the Central BPS, the Logistics Agency (Bulog), the Ministry of Agriculture, Bank Indonesia, and other agencies related to the data needs in this study.

Data analysis was performed using an econometric model built in the form of simultaneous equations. The equation consists of 22 endogenous variables and 26 exogenous variableswith a lag of 14 variables. Furthermore, the model is estimated by the method2SLSLinear system procedure (SYSLIN) and historical simulations for the period 1972-1980, 1981-2001, and the period 2002-2018 used a non-linear simulation procedure (SIMNLIN). The model used first passes through the specification stage in order to meet the model evaluation criteria, namely economic criteria, statistical criteria, and econometric criteria (Koutsoyiannis, 1977). In this study, the reference in measuring the welfare of rice farmers is determined by the producer surplus indicator.

The econometric model that is being built consists of a production block and a market block. The form of simultaneous equation in this study refers to the results of research by Putri, et al., (2013); Septiadi, et al., (2016); Siswanto, et al., (2018); Rifiana and Budiwati (2019); and Busyra (2019) as follows:

**Production Block:**

LAPt = a0 + a1HGTPRt + a2HJTPRt + 3KUTRt + a4LAIt + a5LASIt + a6CHt + a7LSHPt + a8LAPt-1 + Ut ... ......................................... .............................................. ....................... (1)

YPPt = b0 + b1HGTPRt + b2JPUt + b3LSHPt + b4YPPt-1 + Ut .................................. ........ …… (2)

PPSTt = LAPt * PPt …… ....................................... .........................................… …… ....... … .... (3)

PBSTt = PPIt * Kt ......................................... ............................................. ..................... (4)

JPUt = c0 + c1HPURt + c2HGTPRt + c3LAIt + c4 (LASI-LLASI) t + c5JPUt-1 + U ........................ (5)

JTSPt = d0 + d1HTSPRt + d2HGTPRt + 3LAIt + d4LASIt + d5JTSPt-1 + Ut ................................ .. (6)

JPSt = e0 + e1HPSRt + e2HGTPRt + e3 (LAI-LLAI) t + e4LASIt + e5JPSt-1 + Ut ....................... (7)

**Market Block:**

QSBIt = PBIt - JBBt + SBATt + JIBt - EXPORt. …… ................................. ……………… .... (8 )

SBATt = $f_0$ + f1HBERt + f2JLGBt + f3JIBt + f4 (OP / LOP) t + f5SBATt-1 + Ut ............................. .... (9)

JIBt = $g_0$ + g1HIBIRt + g2ERt + g3SBATt-1 + g4 (HBER-LHBER) t + g5PBIt + g6JIBt-1 + Ut ...... (10)

HIBIRt = $h_0$ + h1 (HBDR-LHBDR) t + h2 (TARIF-LTARIF) t + h3HIBIRt-1 + Ut ............................ .. (11)

DBINt = i0 + i1HBERt + i2HJTPRt + i3JPIt + i4PPPt + i5DBINt-1 + Ut …… .................................. (12)

JBBt = PROBt * PBSTt .......................................... ................................................ ......... (13)

JPGBt = j0 + j1HGTPRt + j2SBATt + j3TAPBt + j4PBSTt + j5INFt + j6TWt + j7JPGBt-1 + Ut ........ (14)

JLGBt = k0 + k1DBINt + k2SBATt-1 + k3 ((JPGB-LJPGB) / LJPGB) t + k4LJGBt-1 + Ut ……… ...... (15)

HBERt = l0 + l1HGTPRt + l2PBIt + l3TWt + l4HBERt-1 + Ut ………. ..............................… ... ......... (16)

MPBIt = HBERt - HGTPRt * Kt ......................................... ................................................ .. (17)

PUPPt = (HGTPRt * YPPt) - (HPURt * JPUt) - (HTSPRt * JTSPt) - (HPSRt * JPSt) - UTKRt - BPKRt - BPIRt - SHARt - BPLNRt ……. …… .................................... ...................... (18)

HGTPRt= m0 + m1 (HIBIRt * ERt) + m2HPPt + m3MPBIt + m4PPIt + m5HGTPRt-1 + Ut .............. (19)

HPPRt = n0 + n1HBDRt-1 + n2ERt + 3HPPRt-1 + Ut …………… ..… ......................... …… .. …… (20)

PPMRt = TARIFFRt * JIBt… ... …… ..................................... ...............................................… .. ( 21)

DEVISAt = HIBIRt * JIBt ……………… ....................................... ..............................................… (22)

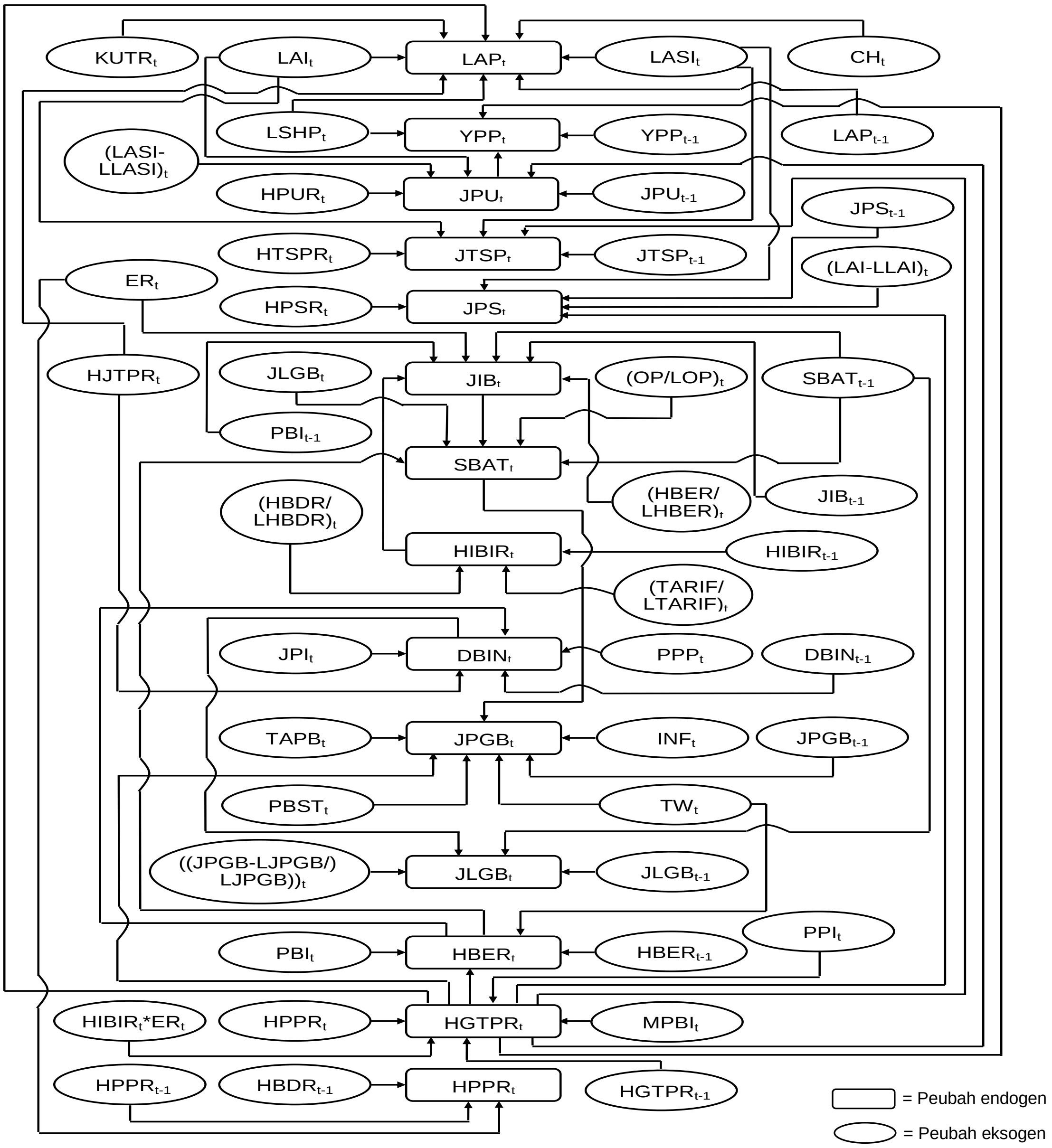


Figure 1. Flow diagram of the relationship between variables

Information:
LAPt = The area of rice harvested (Ha)
HGTPRt = Price of grain at farmer level (Rp / Kg), deflated by the price index consumer (CPI) base year 2010 = 100)
HJTPRt = Price of corn (Rp / Kg), deflated with the 2010 CPI base year = 100)
KUTRt = Farm Credit (Rp)
LAIt = Area of intensification (Ha)
LASIt = Area of irrigation (Ha)
CHt = Rainfall (mm / year)
LSHPt = The area of the pest attack (Ha)
LAPt-1 = Lag is different when the harvest area
Ut = Disturb variable
YPPt = Rice productivity (Kg / Ha)
JPUt = Amount of fertilizer usage (Kg / Ha)
YPPt-1 = Paddy productivity lag
PPSTt = Rice production Central Sulawesi (Kg)
PBSTt = Production Central Sulawesi rice (Kg)
Kt = 0.63 conversion rate
HPURt = Price of urea fertilizer (Rp / Kg), deflated with the CPI base year (2010 = 100)
JTSPt = Total use of TSP (Kg / Ha)
HTSPRt = TSP price (Rp / Kg), deflated by Base year CPI (2010 = 100)
JPSt = Amount of pesticides (Kg / Ha)
HPSRt = Pesticide price (Rp / Kg), deflation with the CPI base year (2010 = 100)
LLASI = Lag area for irrigation
JPUt-1 = Lag the amount of fertilizer use
JTSPt-1 = Lag the number of TSP usage
LLAI = Lag area of intensification
JPSt-1 = Lag the amount of pesticide use
QSBIt = Supply of rice (Kg)
PBIt = Rice production (Kg)
JBBt = Amount rice for seed, usage other / shrinkage (Kg)
SBATt = Year-end rice stock in Bulog (Kg)
JIBt = Amount of imported rice (Kg)
EKSPORt = Amount of rice exports (Kg)
DBINt = Amount of rice consumption for food (Kg) food (Kg)
JPIt = Total population Central Sulawesi (Soul)
PPPt = Population income Central Sulawesi (Rp)
DBINt-1 = Lag the amount of rice consumption for food
JBB = Amount rice for seed, usage others, shrinkage and scatter (kg)
PROBt = Proportion rice for seed, usage other / shrinkage (%)
HPPRt = Government Purchase Price (Rp/Kg), deflated by the base year CPI (2010 = 100)
HGTPRt-1 = Lag in rice price at the farmer level in Central Sulawesi

PBSTt = Central Sulawesi rice production (Kg)
SBATt = Year-end rice stock (Kg)
HBERt = The retail price of rice (Rp / Kg), deflated with the CPI base year (2010 = 100)
JLGBt = The amount of unhulled rice / rice (Kg)
OPt = Bulog market operations (Kg)
LOPt = Bulog market operation lag
SBATt-1 = Year-end rice stock lag in Bulog
Ut = Disturb variable
JPGBt = Amount of grain /rice (Kg) TAPBt = Total procurement budget unhulled / rice (Rp)
INFt = General inflation rate (%)
TWt = Tendency of time
JPGBt-1 = Lag of the amount of grain procurement /rice
JLGBt = The amount of unhulled rice / rice
LJGBt-1 = Lag amount released grain /rice
HBERt-1 = Lag in retail rice price Central Sulawesi
LHBER = Amount of imported rice (Kg)
HIBIRt = Import price of rice (Rp/Kg), deflated with the base year Indonesian CPI (2010 = 100)
ERt = Rupiah exchange rate against Dollar (Rp / US $)
LHBER = Lag in retail rice price
JIBt-1 = Lag in the amount of rice imports
HIBIRt = The import price of rice (US$/Kg)
HBDRt = World rice price (US $ / Kg), deflated with the base year Indonesian CPI (2010 = 100)
LHBDR = World rice price lag
TARIFFRt = Indonesian rice import tariffs (Rp / Kg)
LTARIFR= Lag in rice import tariffs
HIBIRt-1 = Lag in the import price of rice
MPBIt = Marketing margin of rice (Rp/Kg)
Kt = Conversion rate
PUPPt = Farmer farm income rice (Rp / Ha)
UTKRt = Labor wages (Rp/Ha)
BPKRt = Cost of manure (Rp/Ha)
BPIRt = Irrigation irrigation costs (Rp/Ha)
SHARt = Animal and equipment rental fees (Rp/ Ha)
BPLNRt = Other costs (Rp/Ha)
HGTPRt = Farm-level grain prices Sulawesi Middle (Rp/Kg)
HPPRt-1 = Lag in government purchase prices (Rp/Kg)
PPMRt = Government revenue (Rp)
DEVISA = Foreign exchange earnings (US$)
Subcript A = Basic simulation
Subcript B = Policy simulation

**Change in Welfare**

1. Changes in Producer Surplus:
   *PBIA*(HGTPRB - HGTPRA) + ½ (PBIB - PBIA) (HGTPRB - HGTPRA)
2. Change in Consumer Surplus:
   *DBINA*(HBERA - HBERB) + ½ (DBINB - DBINA) (HBERB - HBERA)

## RESULTS AND DISCUSSION

The results of the model evaluation show that all the structural equations built have met economic criteria, statistical criteria, and econometric criteria. Based on economic criteria, the model being evaluated shows that all the signs and the magnitude of the expected parameters on the exogenous variables in the equation are in accordance with the hypothesis.

HasThe estimation of rice economy in Central Sulawesi in this study is quite good. This can be seen from the value of the coefficient of determination (R2) of each behavior equation, which ranges from 0.262 to 0.987, where the equation for the amount of rice imports (JIB) has the lowest R2 value while the rice consumption equation (DBIN) has the highest R2 value. This condition shows that in general the explanatory variables (exogenous variables) in the behavior equation are able to explain endogenous variables well. Meanwhile, based on the durbin-h statistical test, it is known that all equations in the model do not have serial correlation problems. According to Pyndick and Rubinfeld (1991), serial correlation problem only reduces parameter estimation efficiency and serial correlation does not cause parameter regression bias. So the results in the estimation model in this study can be represented as representative in describing the rice economy phenomenon in Central Sulawesi.

Based on the results of the F test statistically, the calculated F-probability value in each equation ranges from <.000 to 0.047. This value indicates that all exogenous variables have a positive influence on endogenous variables. This means that the variation of the explanatory variables in each behavior equation is able to explain well the variation of the endogenous variables at the 99.99% and 99.95% confidence levels. Meanwhile, the t statistic results show that there are several explanatory variables that are not significant or have no significant effect on the endogenous variables at the error level $\alpha$ = 0.05 - 0.20. However, the results of the analysis show that each structural equation has a magnitude of parameters and signs that match expectations and is quite logical from an economic point of view. Therefore,The model in this study can describe the phenomenon of the rice market in Central Sulawesi.

The rice economy model in this study has been tested with a basic simulation for the observation sample from 1972 to 2018.The statistical validation indicators used are Root Mean Square Error (RMSE), Root Mean Square Percent Error (RMSPE) to measure how close the values of each endogenous variable are. the estimation result follows the actual data value during the observation period or how far the deviation is in the percentage measure. In addition, model validation also uses statistical indicators of bias proportion (MW), regression proportion (UR), distribution proportion (UD) and Theil's inequality coefficient (U) statistics in evaluating the model's ability for historical simulation analysis. Basically, the smaller the RMSE, RMSPE, U-

Theil, and the greater the R2 value, the better the estimation of the model. The value of Theil's coefficient (U) ranges between 1 and 0.

The results of the model validation show that there are 12 equations that have an RMSPE value of less than 30%, 6 equations have an RMSPE value between 31% to 100%, and there are 4 equations that have an RMSPE value greater than 100%. Based on the indicators Dist (UD) and Covar (UC) it is known that there are 18 equations (82%) that have a value close to the actual value (close to one), while the other 4 equations are close to zero. Meanwhile, based on the U-Theil value indicator, it is known that there are 21 equations (95%) that have a value close to zero, while one equation is that the year-end rice stock has a U-Theil value close to one. Therefore, based on several indicators of the validation of the model, in general this model is good enough to be used as an estimation model.

**Government Pricing Policy Simulation Scenario Period**

The simulation of historical policy alternatives in this study is grouped into three pricing policy formats based on their implementation, namely:

1. The period 1972 to 1980 or the Basic Price of Grain (HDG) period. The basic price policy for unhulled rice was first explicitly stipulated in 1970/1971 through Presidential Instruction (Inpres) number 11 dated 24 May 1970.The objective of this Presidential Instruction is to stimulate food production, guarantee a reasonable minimum price for farmers, and provide sufficient food stock. big for the government (Inpres RI, 1971; Amang and Sawit, 1999; Amrullah, 2005).
2. The period from 1981 to 2001 or the policy period for the Basic Price of Grain and Rice (HDGB). This price policy was implemented starting in 1980, where the operation was carried out by Bulog. This policy has a positive role in providing production incentives and contributing to efforts to stabilize the price of grain and rice (Timmer, 1997 in Suryana, et al., 2014).
3. The period from 2002 to 2018 or the Government Purchase Price (HPP) policy period. The pricing policy has been updated with the basic government purchase price setting since 2002 (Krisnamurthi, 2003).

The alternative combination of government purchase price policy combinations that will be discussed includes 6 policy combinations, namely the combination of government purchase prices with other inputs, such as the price of urea fertilizer, intensification area and irrigation area. In addition, a combination of policies was implemented with import tariffs and devaluation of the rupiah against the US dollar.

**Simulation 1: Policy to Increase Government Purchase Price (HPP) by 15% and Price of Urea Fertilizer (HPUR) by 5%**

Policy to increase the basic government purchase price by 15% and Urea fertilizer price by 5% simultaneously (simulation 1)will have a biased effect on the producer. This means that producers benefit from an increase in producer surplus in each period, while consumers are disadvantaged by losing consumer surplus in each period. The increase in producer surplus during the HDG period was Rp 1.36 billion, in the HDGB period it was Rp. 3.30 billion, and in the peak HPP period it was Rp. 13.90 billion. Meanwhile, the decrease in consumer surplus during the HDG period was Rp. 4.69 billion, in the HDGB period it was Rp. 7.15 billion, and the peak was Rp. 2.85 billion during the HPP period.

Table 1. The impact of the policy of increasing HPP 15% and HPUR 5% on changes in endogenous variables and farmer welfare

| Simualation Period (Year) | Endogenous Variable Changes (%) | | | | Well-being Rice Farmers (IDR Billion) | |
|---|---|---|---|---|---|---|
| | dHg | dHb | dSb | dDb | dSp | DSK |
| 1972-1980 (HDG) | 2.19 | 2.58 | 0.02 | -0.46 | 1.36 | -4.69 |
| 1981-2001 (HDGB) | 2.78 | 2.89 | 0.11 | -0.41 | 3.30 | -7.15 |
| 2002-2018 (HPP) | 2.04 | 1.69 | 0.07 | -0.49 | 13.90 | -23.85 |

Information:
dHg = Change in price of grain; dHb = Price changes rice; dSb = Change in rice supply; dDb = Change in demand for dSp rice = Change in producer surplus; DSK = change in consumer surplus;

The results of the analysis show that even though the policy to increase the price of fertilizers was implemented, because the HPP increase policy was implemented simultaneously, the farmers still received an increase in income. This phenomenon is in line with the results of Kariyasa's research (2007) which shows that the policy of raising fertilizer prices is actually able to improve the performance of rice production in Indonesia.

**Simulation 2: Policy to Increase HPP by 15% and Intensification Area (LAI) by 5%**

The existence of this alternative combination of policies (simulation 2) also has a biased effect on producers, where producers benefit from an increase in producer surplus in each period, while consumers are disadvantaged by losing consumer surplus in each period. The increase in producer surplus during the HDG period was Rp. 1.35 billion, in the HDGB period it was Rp. 2.43 billion, and in the peak HPP period it was Rp. 10.96 billion. Meanwhile, a decrease in consumer surplus during the HDG period was achieved **amounting to IDR 4.83 billion, in the HDGB period it was IDR 10.99 billion, and in the HPP period also the peak was IDR 34.62 billion.**

Table 2. The impact of the policy on increasing HPP 15% and LAI 5% **against changes in endogenous variables and farmer welfare**

| Simualation Period (Year) | Endogenous Variable Changes (%) | | | | Well-being Rice Farmers (IDR Billion) | |
|---|---|---|---|---|---|---|
| | dHg | dHb | dSb | dDb | dSp | DSK |
| 1972-1980 (HDG) | 2.16 | 2.66 | 0.17 | -0.47 | 1.35 | -4.83 |
| 1981-2001 (HDGB) | 2.03 | 4.44 | 1.23 | -0.58 | 2.43 | -10.99 |
| 2002-2018 (HPP) | 1.60 | 2.46 | 1.05 | -0.66 | 10.96 | -34.62 |

The results of this study are relevant to the results of research by Widadie and Sutanto (2012), and Busyra (2019). Widadie and Sutanto's (2012) report shows that the implementation of a combination policy of increasing HPP and area of intensification has an impact on farmers' profits as producers, in this case farmers experience a producer surplus. This is more triggered by an increase in rice productivity. Meanwhile, Mulwanyi, et al. (2011) found that the implementation of HPP policies and the intensification area had an impact on increasing profits for both producers and consumers. The increase in rice supply led to an increase in rice exports and a decrease in rice imports. The decline in rice imports led to a decrease in government revenue, however the net surplus was Rp 3.

**Simulation 3: Policy to Increase HPP by 15% and Irrigation Area (LASI) by 5%**

The results show that this policy impacts also still has a biased impact on producers, where producers benefit from an increase in producer surplus in each period, while consumers are disadvantaged by losing consumer surplus in each period.

Table 3.The impact of the policy on increasing HPP 15% and LASI 5% **against changes in endogenous variables and farmer welfare**

| Simualation Period (Year) | Endogenous Variable Changes (%) | | | | Well-being Rice Farmers (IDR Billion) | |
|---|---|---|---|---|---|---|
| | dHg | dHb | dSb | dDb | dSp | DSK |
| 1972-1980 (HDG) | 2.08 | 2.89 | 0.58 | -0.51 | 1.30 | -5.25 |
| 1981-2001 (HDGB) | 1.89 | 4.77 | 1.43 | -0.64 | 2.26 | -11.81 |
| 2002-2018 (HPP) | 1.56 | 2.52 | 1.10 | -0.71 | 10.68 | -35.51 |

The increase in producer surplus in the HDG period was achieved by IDR 1.30 billion, in the HDGB period it was IDR 2.26 billion, and in the peak HPP period it was IDR 10.68 billion. Meanwhile, the decrease in consumer surplus during the HDG period was Rp. 5.25 billion, in the HDGB period it was Rp. 11.81 billion, and during the HPP period it also reached a peak of Rp. 35.51 billion.Based on the simulation results above, it can be said that the impact of implementing a combination policy in simulations 1, 2, and 3 has a relatively similar impact on farmer welfare, namely producers benefit while consumers suffer. Therefore, the input combination policy (the three simulations) has not had an effective impact on consumer welfare.

**Simulation 4: Policy to Increase HPP by 15% and Import Tariff (TI) by 10%**

Policy on simulation 4, biased impact on producers and consumers. In the HDGB period, producers benefited from an increase in producer surplus and consumers were still disadvantaged by a decrease in consumer surplus, whereas in the HDG period it did not have any impact. The increase in the producer surplus in the HDGB period was reached by Rp 3.42 billion, while the decrease in the consumer surplus was reached by Rp. 6.66 billion.

Table 4. The impact of the policy of increasing HPP 15% and TI 5% on changes in endogenous variables and farmer welfare

| Simualation Period (Year) | Endogenous Variable Changes (%) | | | | Well-being Rice Farmers (IDR Billion) | |
|---|---|---|---|---|---|---|
| | dHg | dHb | dSb | dDb | dSp | DSK |
| 1972-1980 (HDG) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 1981-2001 (HDGB) | 2.88 | 2.70 | -0.03 | -0.39 | 3.42 | -6.66 |
| 2002-2018 (HPP) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

The results of this study are relevant to the findings of Haryono and Ismono (2011), Setiawan, et al., (2016), and Briones (2019). The implementation of policies to increase HPP and import tariffs will have a biased impact on producers, but harm consumers. Meanwhile, the results of the researchothers find that the tariff policy is not profitable for the farming sub-sector in terms of harvested area, yields, and productivity (Briones, 2018). Furthermore, the research results of Sebayang, et al. (2019) concluded that sOverall alternative policies to increase import tariffs are not economically efficient.

**Simulation 5: Policy of Increasing HPP by 15% and Decreasing Exchange Rate (NT) by 10%**

The existence of this alternative combination of policies will have a biased effect on producers, where producers benefit from an increase in producer surplus in each period, while consumers are disadvantaged by losing consumer surplus in each period. The increase in producer surplus in the HDG period was achieved by Rp 1.30 billion, in the HDGB period amounting to Rp 2.17 billion, and in the HPP period of Rp 3.76 billion. Meanwhile, the decrease in consumer surplus during the HDG period was Rp. 4.44 billion, in the HDGB period it was Rp. 4.55 billion, and in the HPP period it reached Rp. 7.15 billion. Therefore, it can be said that this policy package has not yet had an effective impact on the regional economy in Central Sulawesi.

Table 5. The impact of the policy of increasing HPP by 15% and reducing NT by 10% on changes in endogenous variables and farmer welfare

| Simualation Period (Year) | Endogenous Variable Changes (%) | | | | Well-being Rice Farmers (IDR Billion) | |
|---|---|---|---|---|---|---|
| | dHg | dHb | dSb | dDb | dSp | DSK |
| 1972-1980 (HDG) | 2.09 | 2.45 | -0.11 | -0.44 | 1.30 | -4.44 |
| 1981-2001 (HDGB) | 1.83 | 1.84 | -0.23 | -0.29 | 2.17 | -4.55 |
| 2002-2018 (HPP) | 0.55 | 0.51 | -0.42 | -0.21 | 3.76 | -7.15 |

**Simulation 6: Policy to Increase HPP by 15%, HPUR by 5%, LAI 5%, LASI 5%, TI 10%, and NT by 10%**

The application of this alternative combination of policies also still only has a biased effect on producers, where producers benefit from an increase in producer surplus, while consumers are also disadvantaged by losing consumer surplus in each period. The increase in producer surplus during the HDG period was Rp.1.34 billion, in the HDGB period it was Rp.2.40 billion, and in the peak HPP period it was Rp.17.56 billion. Meanwhile, the decrease in consumer surplus during the HDG period was Rp. 5.71 billion, in the HDGB period it was Rp. 18.87 billion, and in the HPP period it was Rp. 64.65 billion.

Table 6.The impact of the policy of increasing HPP 15%, HPUR, LAI, LASI 5%, TI 10%, and NT down 10% on changes in endogenous variables and farmer welfare

| Simualation Period (Year) | Endogenous Variable Changes (%) | | | | Well-being Rice Farmers (IDR Billion) | |
|---|---|---|---|---|---|---|
| | dHg | dHb | dSb | dDb | dSp | DSK |
| 1972-1980 (HDG) | 2.13 | 3.14 | 0.92 | -0.54 | 1.34 | -5.71 |
| 1981-2001 (HDGB) | 1.99 | 7.62 | 3.06 | -0.95 | 2.40 | -18.87 |
| 2002-2018 (HPP) | 2.55 | 4.58 | 2.70 | -1.20 | 17.56 | -64.65 |

The results of this study are relevant to the results of research by Mulwanyi, et al. (2011) which found that the effect of a combination of policies on the increase in real HPP, irrigation areas, areas of intensification, and real rice import tariffs of 20% will have a biased effect on producers and losses for consumers. The same thing was also found by Setiawan, et al. (2016), where the combination of HPP increase policy simulations with other inputs proved less effective as compensation for the policy of increasing urea fertilizer prices, increasing irrigation area, intensification areas, and import tariffs.

A summary illustration of the impact of a combination of HPP policies on changes in farmer welfare in simulations 1- 6 is presented in Figure 2.

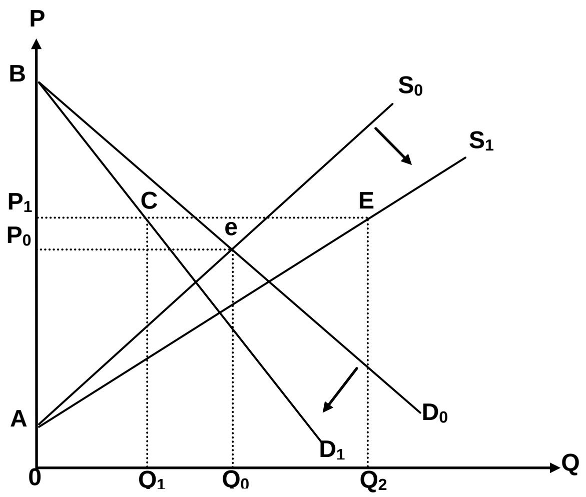


Figure 2. The impact of a combination of HPP policies on changes in producer surplus and consumer surplus

Figure 2 shows that the producer surplus is initially at point AeP0 and consumer surplus is at point P0eB. The various combinations of HPP policies with various other inputs (increase in fertilizer prices, area of intensification, area of irrigation, increase in import tariffs, and a decrease in the rupiah exchange rate) led to a change in the surplus. The policy combination scenario has an impact on an increase in the price of grain at the farm level and an increase in the retail price of rice in the market by (P1). As a result, there is a shift in the supply curve from S0 to S1 which has an impact on increasing the amount of farm productivity from Q0 to Q2, so that the producer surplus becomes AEP1 with a change value of (dSp = AEP1 - AeP0). Furthermore,

This figure shows that there was an increase in producer surplus in each simulation, triggered by an increase in the price of grain at the farmer level that occurred in each period (Table 1-6). The increase in grain price changes in each simulation per period ranged from 0.55% - 2.88%, where the highest grain price change was achieved in the 4 HDGB simulation periods, while the lowest grain price change was achieved in the 5 HPP period simulation. Meanwhile, the decline in the consumer surplus was triggered more by a decrease in consumption due to an increase in retail rice prices on the market. The results of the study (Table 1-6) show that the highest increase in retail rice prices was achieved in the simulation of 6 HDGB periods, namely 7.62%, while the lowest increase in retail rice prices was achieved in the 5 HPP period simulations, namely 0.51%.

## CONCLUSION

The combination of government purchasing price policies in all simulation scenarios has a biased (positive) impact on changes in producer surplus. This means that the combination of these policies benefits rice farmers as producers, both in the HDG period, HDGB period, and in the HPP period. In addition, the existence of a combination of these policies is actually detrimental to consumers, which is indicated by the negative value of consumer surplus, where the amount of change is greater than the change in the value of the producer surplus. Therefore, the instrument for combining the HPP policy with other production inputs is maintained to ensure a real increase in farmer welfare.

## REFERENCES

Akhmad. 2014. Microeconomics Theory and Applications in the Business World. ANDI. Yogyakarta.

Amang, B. and H. Sawit. 1999. National Rice and Food Policy: Lessons From the New Order and the Reform Era. Bogor Agricultural Institute. Bogor.

Amrullah, S. 2005. Rice in Political Economy Dynamics. Food Magazine 14 (44): 48-60.

Briones, RM 2018. Scenarios for the Philippine Agri-food System with and without Tariffication: Application of a CGE Model with Endogenous Area Allocation. Discussion Paper Series No. 2018-51. Quezon City: PIDS.

Briones, RM 2019. Welfare impacts of Rice Tariffation. Philippine Institute for Development Studies. Discussion Paper Series No. 2019-16. Quezon City: PIDS.

BPS, 2004-2018. Central Sulawesi in Figures. Central Sulawesi Provincial Statistics Agency. Hammer.

Busyra, RG 2019. Impact of the Application of Rice Cultivation Technology on the Welfare of Rice Farmers. Journal of MeA (Agribusiness Media). 4 (2): 53-67.

Haryono, D and Ismono, H. 2011. Impact of the Rice Import Tariff Policy on the Welfare of Rice Farmers and Consumers of Rice. ESAI Scientific Journal. 5 (1): 1-12.

Hutauruk, J. 1996. Policy Analysis of the Base Price of Rice and Fertilizer Subsidies on the Demand and Supply of Rice in Indonesia. Thesis. Postgraduate School, Bogor Agricultural University, Bogor.

Kariyasa, K. 2007. Proposal for HET for Fertilizer Based on the Effectiveness of the Grain Purchase Price Policy. Journal of Agricultural Policy Analysis. 5 (1): 72-85.

Koutsoyiannis. 1977. Theory of Econometrics: An Introductory Exposition of Econometric Methods. Second Edition. The MacMillan Press Ltd., London.

Krisnamurthi, B. 2003. Reconstruction of Food Policy Issues and Agenda. Food Magazine. 12 (40): 12-16.

Marlian, AH, S. Mardianto and M. Ariani. 2004. Factors Affecting Production, Consumption, and Prices of Rice and Inflation of Foodstuffs. Agro Economics. 22 (2): 119-146.

Mulwanyi, A., P. Hutagaol, and BM Sinaga. 2011. Impact of Rice Purchasing Policy on Welfare of Both Producers and Consumers in Indonesia. J. ISSAAS. 17 (2): 48-57.

Pindyck, RS and DL Rubinfeild. 1991. Econometric Models and Economic Forcasts. Third Edition. McGarw-Hill Inc., New York.

Putri, EIK, Novindra, and Nuva. 2013. The Impact of Grain Farmer Purchase Price Policies on Farmer Welfare: A Simulation. Journal of Indonesian Economy and Development. 13 (2): 125-142.

Rifiana and N. Budiwati. 2019. Analysis of the Impact of Rice Policy in the Framework of Reducing Poverty Levels in South Kalimantan (Econometric Approach). Proceedings of the National Seminar on Wetland Environment. 3 (1): 57-61.

Sebayang, VB, BM Sinaga, Harianto, and IK Kariyasa. 2019. The Impact of Domestic Policy on Farmers' Welfare and Maize Processing Industry in Indonesia. International Journal of Economics and Financial. 9 (3): 225-232.

Sembiring, SA, Harianto, Siregar, H., and Saragih, B. 2012. The impact of government policy through the 2005-2008 presidential instruction regarding rice policy on food security. Postgraduate Forum. 35 (1): 15-24.

Septiadi, D., Harianto, and Suharno. 2016. The Impact of Rice Price Policies and Irrigation Area on Poverty Alleviation in Indonesia. Indonesian Journal of Agribusiness. 4 (2): 91-106.

Setiawan, E., H. Sri, BM Sinaga, and MP Hutagaol. 2016. The Impact of Input, Output, and Rice Trade Policies on Staple Food Diversification. Journal of Agro Economics. 34 (2): 81-104.

Septiadi, D., Harianto, and Suharno. 2016. The Impact of Rice Price Policies and Irrigation Area on Poverty Alleviation in Indonesia. Indonesian Journal of Agribusiness. 4 (2): 91-106.

Siswanto, E., BM Sinaga, and Harianto. 2018. The Impact of Rice Policy on the Rice Market and the Welfare of Rice Producers and Consumers in Indonesia. Indonesian Journal of Agricultural Sciences (JIPI). 23 (2): 93-100.

Sitepu, RK and BM Sinaga, 2006. Application of Econometric Models: Estimation, Simulation and Forecasting Using SAS. Agricultural Economics Study Program, Graduate School, Bogor Agricultural University, Bogor.

Suryana, A., B. Rachman, and MD Hartono. 2014. Dynamics of Grain and Rice Price Policies in Support of National Food Security. Journal of Agricultural Innovation Development. 7 (4): 155-168.

Widadie, F. and A. Sutanto. 2012. Rice Economic Model: Market Integration Analysis and Price Policy Simulation. UNINTERESTING. 8 (2): 12: 51-182.