IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 11, Issue 9 Ver. II (September 2018), PP 57-61
www.iosrjournals.org

Price Risk Impact on Welfare of Shallot Farmer Household in Sigi District

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Abstract: *Price which fluctuates is a major factor in price risk. Furthermore, higher price risk will have an impact on reducing farmer household welfare. This study aims to analyze the impact of price risk on household welfare of shallots farmers in Sigi district with a sample of 210 respondents. The results showed that the highest price expectation on medium land was Rp35,500 per kilogram and the lowest was in a narrow area of Rp34,000 per kilogram. The highest price risk occurs on large land (standard deviation of 6033.44) and the lowest is on medium land (standard deviation of 5697.23). A 5% price risk increase has the effect on reducing onion, non onion and non-farm farming income. Total household income and household expenditure decreased so that welfare decreased.*

Keywords: *Impact, Price Risk, Welfare, Farmer Household, Red Onion*

Date of Submission: 28-09-2018 Date of acceptance: 15-10-2018

I. Introduction

Debertin (1986) explains that agriculture is characterized by conditions that are full of risks, namely production risk and price. This is because agricultural activities are vulnerable to climate change, pest and disease attacks and fluctuations in the prices of agricultural products on the market. One of the off-farm problems that is often expressed in horticultural agribusiness is the problem of price fluctuations. High price fluctuations are not beneficial for horticultural agribusiness development because it can have a negative influence on the decision of the capital owner to invest due to the uncertainty of acceptance that will be obtained (Hutabarat, 1999 in Irawan, 2007).

Price fluctuations are often detrimental to farmers because farmers generally cannot regulate the time of sale to get a more profitable selling price (Irawan, 2007). Price fluctuations are often more detrimental to farmers than traders because farmers generally cannot regulate their sales time to get a more profitable selling price. Besides that, high price fluctuations also provide opportunities for traders to manipulate price information at the farm level so that price transmission from the consumer market to farmers tends to be asymmetrical, meaning that if there is a price increase at the consumer level then the price increase is not passed on to farmers quickly and perfectly. This is the contrary of when there is a decline in prices (Simatupang, 1999).

BPS (2015) informed that the development of prices of shallots producers in Indonesia in 1984-2014 tended to increase with an average growth of 14.83% per year. In 1984 the price of shallot producer was Rp615 per kg and then increased to Rp15,591 per kg in 2014. This was the highest producer price during the period 1984-2014. While the development of Indonesian shallots prices at the consumer level during the period 1984-2014 also tended to increase with an average growth of 17.89% per year which was higher than the average growth of producer prices in the same period of the year. In 1984 the price of shallot consumers was Rp759 per kg. Then in 2014, it was Rp26,511 per kg. The highest price of shallot consumers during the period 1984-2014 was in 2013, which amounted to Rp30,751 per Kg.

Data from the Agriculture Service of Central Sulawesi Province (2017) show that the price of Palu valley shallots is quite fluctuating. In 2011 the price was Rp20,000 / kg and increased to Rp40,000/kg in 2012. In 2013 the price dropped to Rp27,000/kg, and in 2014 it increased to Rp28,000/kg, in 2015 it rose dramatically to Rp42,000/kg and fell again to Rp33,000/kg in 2016. The price fluctuations were caused by fluctuations in the demand and supply of shallot products.

Risk factors that arise in cultivating shallots are due to fluctuating prices. Farmers are only as price takers. On the other hand, the government has not provided full protection through import policies and basic pricing so that farmers often suffer losses due to price fluctuations (Budiningsih and Pujiharto, 2006).

In Braun (1995) explained that the main driving force of the process of agricultural commercialization includes a conducive macroeconomic environment, non-distortive trade policies, infrastructure development, legal environment and farming contracts. Policies related to this driving force will greatly affect the nature and speed of the process of agricultural commercialization and ultimately have an impact on agricultural household income. Porto (2016) in its research results shows that price changes have an impact on the expenditure of farmer's household consumption. High prices will increase farm income, the total consumption expenditure increases so that the household welfare of farmers increases. Based on the background above, the analysis of the impact of price risk is important to be studied in a study. Therefore, this study was carried out to analyze the price risk impact on the welfare of shallot farmer households in Sigi district.

II. Framework

The price of shallots is influenced by many factors. Two determinants of shallot prices include expectations and price risks. The higher the price expectation of shallots, the higher the price of shallots, but non shallots and non-agriculture will decrease. Conversely, the lower the expectation of price of shallots, the lower the price of shallots, but non shallots and non-agriculture will increase.

Volatility of input and output prices is important sources of price risk in agriculture. Price of agricultural products tends to change. It is unstable and there is no certainty. Price variability is the influence of endogenous and exogenous markets. Changes that occur in the market will be affected by demand conditions and offers. Changes in the price of agricultural products will affect the interest of farmers to produce.

On the other hand, the higher the price risk of shallots, the price of shallots will decrease. On the contrary, the lower the risk of the price of shallots, the price of shallots will increase. Changes in expectations and price risks will result in changes in farmer's household income and expenditure so that this brings the impact on welfare.

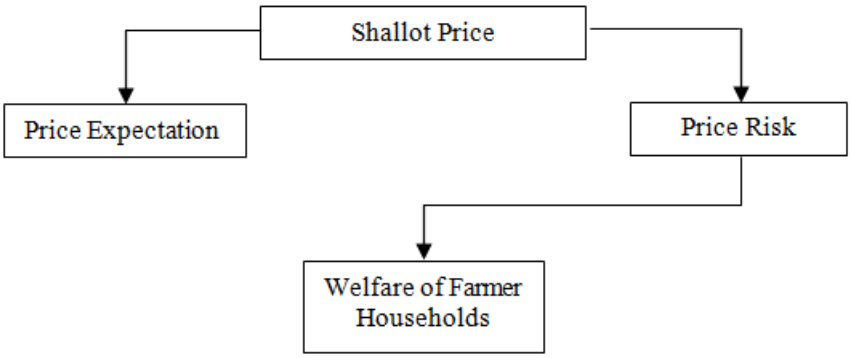

Figure 1. Research Framework

III. Methodology

1. Data Collection

Determination of the research area was carried out purposively. Central Sulawesi Province was chosen as a research area with the consideration that the area is one of the shallot production centers in Indonesia. Furthermore, Sigi Regency was chosen as the research location, considering that the area was the highest producer of shallots in Central Sulawesi. Sigi Biromaru and Dolo sub-districts were chosen to represent the Sigi Biromaru District with the consideration that the two sub-districts were the production centers. There were 4 villages representing Sigi Biromaru District, and there were 5 villages representing Dolo Subdistrict. Determination of research villages is based on the consideration of land area and production. The sample of farmers used was 210 respondents. Determination of sample farmers used a random sampling method.

2. Data analysis

Some measures of risk that can be used are based on variance, standard deviation and coefficient of variation (Anderson et al., 1977; Calkin and DiPietre, 1983; Elton and Gruber, 1995; Fariyanti, 2007). The three measures of risk are interrelated with each other and the value of variance as another measure of size. Standard deviation is the square root of variance while the coefficient of variation is the ratio between the standard deviation and the expectation value. The price risk is measured as follows:

$$EXHBP = p_t\ HBPT + p_n\ HBPR + p_r\ HBPN$$

Where:

EXHBP = Expectation of the shallot price of Palu valley varieties

p_t = opportunity for farmer to get the highest price (%)
p_n = opportunity for farmer to get normal prices (%)
p_r = opportunity for farmers to get the lowest price (%)
HBPT = the highest price of shallot variety in Palu valley ever obtained by farmers (Rp)
HBPR = the lowest price of shallot variety in Palu valley ever obtained by farmers (Rp)
HBPN = the normal price of shallot variety in Palu valley ever obtained by farmers (Rp)

The economic model of the shallot farmer household is built in a simultaneous equation system. The number of equations 32 consists of 23 behaviors and 9 identities. The number of 46 variables consists of 32 endogen variables and 14 exogenous variables. The model identification results showed that the model was over identified and it was estimated by using the 2SLS method - Two Stage Least Squares.

IV. Results and Discussion

1. Price Risk

Shallots are one of the horticultural commodities that often experience price fluctuations due to price uncertainty received by farmers. With price fluctuations occurring at the farmer level, there is a risk of shallot prices in Sigi Regency. Price risk assessment is carried out by measuring variance, standard deviation and variation coefficient (variation coefficient).

Based on this, it can be seen that the highest price is at the level of a large-scale farmer for one year of Rp42,600 per kilogram. The normal price is Rp32,500 per kilogram and the lowest price is Rp27,000 per kilogram. The highest price is at the level of a medium-sized farmer at Rp41,800 per kilogram, the normal price is Rp32,000 per kilogram and the lowest price is Rp26,800 per kilogram. The highest price is at the small holder farmer level, that is, Rp41,000 per kilogram. The normal price is Rp32,600 per kilogram and the lowest price is Rp26,400 per kilogram, so it can be concluded that there are differences in prices received based on the area of land cultivated by each shallot farmer. The price difference is presented in table 1, in which this will have an impact on farmers' income. For farmers with large land, generally they can get the highest, lowest and normal prices that are higher compared to those who have medium and narrow land.

Table 1. The average price of shallot (Rp/Kg) and the opportunity which can be obtained based on the size of farmers' land in Sigi Regency, 2018

Explanation	Narrow land		Medium land		Wide land	
	Average	SD	Average	SD	Average	SD
The highest price	41334.51	2496.43	41848.48	2518.04	42597.83	2659.39
The lowest price	26847.83	1440.60	26441.30	2927.87	27384.62	1745.874
The normal price	32681.10	1554.14	32337.84	1207.93	32555.56	1781.349
High opportunity	0.37	0.10	0.43	0.19	0.45	0.16
Low opportunity	0.28	0.15	0.18	0.18	0.22	0.22
Normal opportunity	0.35	0.17	0.39	0.24	0.33	0.22
Price expectation	34090.38	1565.82	35537.04	2500.98	35362.32	2633.15

Source: Processed Primary Data, 2018

Next the opportunity is the frequency of an event. At the wide area, the highest opportunity is 45%, the normal opportunity is 33% and the lowest opportunity is 22%. At the medium area, the highest opportunity is 43%, the normal opportunity is 39% and the lowest opportunity is 18%. At the narrow area, the highest opportunity is 37%, the normal opportunity is 35% and lowest opportunity is 28%. High price opportunities occur on wide land compared to medium and narrow land, but farmers rarely receive the highest price. They often receive the lowest and normal prices.

After knowing the highest, lowest and normal opportunities, it is important to look at the expected price or price return expected in carrying out shallot farming. Based on the results, it indicated that there will be an impact on the income and welfare of shallot farmers. This can be seen in the extensive land price estimation of Rp35,300 per kilogram, medium land of Rp35,500 per kilogram (highest) and narrow land of Rp34,000 per kilogram (lowest). In the area of medium-sized land farmers are more efficient and effective in managing shallot farming in Sigi Regency.

Table 2. The result of Shallot Price Risk Calculation in Sigi Regency, 2018

Explanation	Average		
	Narrow land	Medium land	Wide land
Variant	35578051.64	33854283.95	38403985.51
Deviation standard	5884.01	5697.23	6033.40
Variation cooefisient	0.17	0.16	0.17

Source: Processed Primary Data, 2018

The data presented in table 2 shows that the highest price risk occurs in the broadest and lowest land on medium land. This is indicated by the highest standard deviation value in wide land (6033.44) and the lowest is in medium land (5697.23). High and low price risk is caused by the demand and supply of shallot commodities that fluctuate at the farmer's household level and the absence of institutions that functions to find information on the price of shallots in Sigi Regency. Another factor that has a big influence is the wife's education level. The wife's education level for farmer households with wide land is lower than that of medium and narrow land so that it has an impact on decision making. This is enough to contribute to the head of the family. Therefore, land farmers are experiencing a lower price risk.

2. Economic Model Validation Results of Farmer Household

Validation of the economic model of shallots farmer households resulted in a value of U-Theil which is smaller than 0.5 as many as 23 variables (71.88%) and which was larger than 0.5 as many as 9 variables (28.13%). This result shows that the predictive value of endogenous variables is close enough to the actual value. Therefore, the model is good enough to be used for simulation.

3. Impact of Increased Price Risks on Household Farmers' Welfare

The increase 5% of price risk has the effect of reducing land area, productivity and onion production. The decrease in the area of arable land, productivity and production is due to the decrease in the use of input of seeds, fertilizers and pesticides unless the use of TSP fertilizer has increased. The increase in price risk has the effect of reducing the allocation of male and female workers in the family to shallot farming but increasing the allocation of male and female workers outside the family so that the total workforce for shallot farming increases. The allocation of labor for non-onion men and non-agricultural women decreased, but the allocation of labor for non-onion women and non-agricultural men increased.

Table 3 Results of Price Risk Simulation Impact on Farmer Household Welfare in Sigi District, 2018

Label	Variable	Basic Value	% Δ
LLBP	The area of shallots	0.7694	-0.22095
PRDBP	Shallots productivity	2875.8	-0.50073
PRODBP	Shallots production	2606.4	-0.63689
PBTBP	Use of shallots seeds	748.5	-0.16032
PUR	The use of Urea shallots farming	83.7572	-0.17264
PSP	Use of shallots farming SP fertilizer	91.1879	-1.37441
PKCL	Use of KCL fertilizer shallots farming	47.6626	-1.94534
PTSP	Use of TSP fertilizer shallots farming	51.6692	0.07142
PNPK	Use of NPK fertilizer shallots farming	80.4138	-0.81777
PEST	Use of shallots farming pesticides	3.8351	-1.00649
PTKP	Use of family labor-male in shallots farming	25.1313	-0.16394
PTKW	Use of family labor-female in shallots farming	2.8001	-8.40684
TDBP	Use of family labor in shallots farming	27.9313	-0.98993
PTLP	Use of hired labor-male in shallots farming	102.4	0.39062
PTLW	Use of hired labor-female in shallots farming	106.1	0.09425
TLBP	Use of labor hired in shallots farming	208.4	0.28791
TKBP	Total of shallots farming labor	236.3	0.16928
PTKPNB	Use of family labor-male in non-shallots farming	50.4089	-0.34676
PTKWNB	Use of family labor-female in non-shallots farming	49.4105	2.38431
PTKPNP	Use of non-agricultural male workers	113.4	2.64550
PTKWNP	The use of non-agricultural women labor	239.6	-6.26043
TPNBP	Total of non-shallots income	8231094	-0.00006
TPNP	Total of non-agricultural income	4212984	-3.44948
TBUBP	Total cost of shallots farming	64083484	-0.17485
PUBP	Shallots farming income	27787369	-1.67175
TPRT	Total household income	40231447	-1.51589
KP	Food consumption	28608609	-0.06152
KNP	Non-food consumption	26312057	0.06403
TKONS	Total Consumption	54920666	-0.00137
KS	Health investment	2838380	-8.43714
TPENG	Total expenditure	57759046	-0.41592
TAB	Savings	4603844	1.48280

Note: Increase 5% of Price Risk

The increase 5% of price risk has the effect of reducing shallots, non-shallots and non-agricultural income. Total household income and household expenditure decreased so that welfare decreased. However, the increase in price risk has the effect of increasing farmers' household savings.

V. Conclusion and Suggestions

1. Conclusion

The highest price expectation on medium land is Rp35,500 per kilogram and the lowest is on a narrow area, which is Rp34,000 per kilogram. The highest price risk occurs on wide land (standard deviation of 6033.44) and the lowest occurs on medium land (standard deviation of 5697.23). High and low price risk is caused by the demand and supply of fluctuating shallots and the absence of institutions that function to find information on the price of shallots in Sigi Regency. The increase 5% of price risk has the effect of reducing onion, non-onion and non-farm farming income. Total household income and household expenditure decreased so that welfare decreased.

2. Suggestion

There needs to be an institution at the level of an effective farmer to support in obtaining price information that is in line with developments so as to reduce the impact of the risk of the price of shallots in Sigi Regency. The government needs to set the base price of shallots to reduce price risk so that farmer household income and welfare increases.

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Sherley Siseraf Pamusu. "Price Risk Impact on Welfare of Shallot Farmer Household in Sigi District." IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) 11.9 (2018): 57-61.