The impacts of harvest on price index of producer (Case study: Hamparan Perak Subdistrict, Deli Serdang Regency, Indonesia)

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Abstract. Producers price index is a means of measuring the welfare of farmers, so calculating producers price index can know the level of welfare of farmers. This is related to the purchasing power in the fulfilment of household consumption needs. One of the classic problems that rice farmers often encounter is the drop in the selling price of grain/rice during harvest time, and rising prices when outside the harvest. The research objective is to analyse the impacts of harvest on producers' price index. Producers price index at harvest time is lower than non-harvest, so that farmer's welfare during harvest time is decreasing seen from decreasing of farmers' producers price index of the rice farmer. Low producers price index due to high harvest resulted in decreasing consumption of home staple foods.

1. Introduction

Indonesia is an agrarian country whose majority of the population lives from the agricultural sector. Development of agriculture run by central and regional government aims to improve the welfare of the farmer community. It is undeniable that agricultural development has contributed to the success of national development [1]. The successful form of agriculture sector in national development is in the formation of GDP, employment absorption, increasing public income, earning foreign exchange through the export of agricultural products that can suppress inflation [2]. The contribution of agriculture is strongly related to the level of welfare of farmers, where the welfare of farmers can be assessed from Producers price index. Land ownership and land status make a difference of farmer’s acceptance. This difference will affect the producers’ price index so that the development of producers price index can be mentioned as one of the determinants of the real income level of farmers or commonly referred to as farmer welfare indicators [3].

Producers price index is a mean of measuring the welfare of farmers. The measuring producers’ price index is important in sustainable agriculture development and achieving food sovereignty. The increase in the production and income of rice farmers may not improve their welfare if the purchasing power does not increase. This is related to the purchasing power in the fulfillment of household consumption needs. The welfare of rice farmers is relatively increasing if the income from rice farming increases [4].

The structure of household expenditure is influenced by several things such as changes in the expenditure on time, differences between tastes, income, and environmental differences. Available household expenditure behavior should be by the level of income earned and how to distribute it, so as not to be shaken to meet the needs below the level of welfare. The access of households to the
The welfare of the farmers can be seen merely by how he fulfills his family's needs, both from the consumption of food, clothing, health, and residential living requirements. One of the classic problems that rice farmers often encounter is the drop in the selling price of grain/rice during harvest time, and rising prices when outside the harvest. This condition causes farmers to lose and unprofitable rice farming.

Deli Serdang Regency which is one of the most abundant harvest production is often harvest in several regions simultaneously. The price of dry grain (GKP) previously Rp 4,800, - / Kg decreased to Rp 3,800 / kg in Percut Sei Tuan area during the high harvest that occurred in February. The above can lead to reduced acceptance of farmers so that farmers' income is also reduced if the production of farmers remains. Thus, farmers will meet their household needs according to their income to be allocated as possible. Based on the background description of the issues raised in this study is how the impact of the harvest on the Producers price index.

2. Literature review

2.1. Farmer terms of trade

Farmer Trade Rate can be interpreted as the ratio between the price index received by farmers and the price index paid by the farmers, which means as a measure of the ability of the exchange of products produced on products and services that can be purchased by farm households, whether for farm input costs or for farmers' household consumption costs [1][5][6]. Producers price index besides illustrating the strength of purchasing power of commodities is also related to household economic behaviour, where the process of household decision making to produce, spend and consume a good is part of household economic behaviour. High producers price index will encourage farmers' enthusiasm in their business [4]

Conceptually, the direction of the high producers' price index will increase or decrease is the sum of the revenue component having a positive value and the payment component having negative value. If the rate of receipt from farmers has a greater value than the rate of payment farmers eat the exchange rate of farmers will increase, and vice versa. The up and down movements of the producers' price index illustrate the ups and downs of farmers' welfare [7].

The concept of a sustainable producers’ price index is a further development of the producers' price index. Sustainable producers price index describes the exchange rate of total farmers' income for their livelihood needs [8]. Farmers' acceptance is the sum of all agricultural products produced by farmers and the value of agricultural products produced by farmers. Farmer expenditure is the sum of expenditures for household consumption and expenditures for farming production costs.

Producers price index is formulated as follows.

\[
\text{Producers Price Index} = \frac{\sum P_{xi}Q_{xi}}{P_{y}Q_{y} + P_{z}Q_{z}} \times 100
\]

Where:
- \( P_{xi} \): Price of agricultural commodities to \( i \)
- \( Q_{xi} \): the production of agricultural commodities to \( i \)
- \( P_{y} \): Consumer product price
- \( Q_{y} \): Number of consumer products
- \( P_{z} \): The price of input production products
- \( Q_{z} \): Number of production inputs

Producers price index describes the farmers' purchasing power from farming to household expenditures for their livelihoods that include consumption expenditures and expenditures on
production costs. Operationally the concept of NTS can only be done at the micro level of household analysis unit [7].

3. Material and method

3.1. Location and Sample Determination Methods
Hamparan Perak sub-district was chosen because it has the largest rice production in Deli Serdang Regency, so it is considered able to realize rice farmers in Deli Serdang District. There were 6 villages selected as samples in this study, this was because the 6 villages had above-average production in Hamaparan Perak District. A total of 98 farmers were sampled using Stratified Random Sampling.

| No | Village         | Population | Sample (KK)            |
|----|----------------|------------|------------------------|
| 1  | Paya Bakung    | 676        | 676/4.769 x 98= 14     |
| 2  | Bulu Cina      | 665        | 665/4.769 x 98=14      |
| 3  | Tandam Hilir II| 1.073      | 1.073/4.769 x 98=22    |
| 4  | Kota Datar     | 825        | 825/4.769 x 98=17      |
| 5  | Paluh Manan    | 418        | 418/4.769 x 98= 8      |
| 6  | Paluh Kurau    | 1.112      | 1.112/4.769 x 98=23    |

| Amount       | 4.769          | 98           |

3.2. Data analysis method
To know the impact of harvest on farmer exchange value used comparative and descriptive method, that is compare test with help of SPSS to test whether there is difference of non-producers’ price index and during harvest. To see the effect of producers’ price index on the consumption of basic food staple farmers conducted the same test, see if there are differences in consumption at the time of non-harvest highway and harvest.

Decision making criteria use significant value / P-Value
- If significant value / P - Value > 0.05; Then H₀ accepted
- If significant value / P - Value <0.05; Then H₁ is accepted

4. Result and discussion

4.1. Impact of harvest to producer’s price index
Hamparan Perak Sub District consists of 20 villages; from 6 sample villages several areas harvest at the same time. In that sense, the harvest months are the same and close together. In April Paya Bakung Village, Chinese Fur, and some land in Tandam Hilir II were harvested. At the end of March entering April, the villages of Tandem Hilir II and Paluh Kurau also experienced harvest. While in February Desa Datar, Paluh Manan, Paluh Kurau harvest. In September Paya Bakung Village, Chinese Feather Village, Paluh Manan Village is harvesting together. So from March to April, the rice is abundant, and the same thing happened in September. The lowest grain price at the farmers’ level is during the April and late September harvest periods. The price of grain from Rp4,539, - / Kg changed to Rp 3.683, - / Kg.

From Table 2, can be seen the level of welfare of farmers in Hamparan Perak Sub District:
1. Producers price index > 100, meaning that the farmer has a surplus. The price of production rose more than the increase in the price of consumption. Farmers’ income is higher than their expenditure. Thus the welfare of the farmers is better than the farmers' welfare.
2. Producers price index = 100, meaning that farmers experience breaks even. Increase/decrease in production price equal to the percentage increase/decrease in the price of consumer goods. Farmers’ welfare level has not changed.
3. Producers price index <100, meaning farmers have the deficit. The increase in the price of its products is relatively smaller compared with the increase in the price of its consumable goods. In this situation, farmers are said not prosperous.

Table 2. Exchange Rate of Non-Harvest Farmers

| No | Producers price index (%) | Amount(RT) | Percentage (%) |
|----|----------------------------|------------|----------------|
| 1  | <50                        | 46         | 47             |
| 2  | 51 < Producers price index <75.5 | 20         | 20.4           |
| 3  | 75.5 < Producers price index <90 | 8          | 8.16           |
| 4  | 90 < Producers price index <100 | 6          | 6.12           |
| 5  | >100                       | 18         | 18.36          |
|    | Amount                     | 98         | 100            |
|    | Average                    |            | 65.46%         |

Based on Table 2 there are 18.36% of farmers who have producers price index above 100% if not high harvest means that farmers have a surplus from paddy farming. Thus, farmers who have producers price index above 100% can be said to be prosperous. Following the criteria above the number of prosperous farmers or those with a surplus of farming amounted to 18 farmers from 98 sample farmers, and farmers who have producers price index below 100% or classified as not prosperous and or less prosperous are still considered a lot. When farmers have a decreasing harvest, the following is the explanation:

Table 3. Producers price index tabulation during the harvest season

| No | Producers price index (%) | Amount (RT) | Percentage (%) |
|----|----------------------------|-------------|----------------|
| 1  | <50                        | 56          | 57.2           |
| 2  | 51 < Producers price index <75.5 | 16         | 16.3           |
| 3  | 75.5 < Producers price index <90 | 12         | 12.2           |
| 4  | 90 < Producers price index <100 | 4          | 4              |
| 5  | >100                       | 10          | 10.2           |
|    | Amount                     | 98          | 100            |
|    | Average                    |             | 53.12%         |

From Table 1 and 2 it can be seen that when the average harvest of producers’ price index is 65.46% while the average harvest of producers price index is 53.12%. This figure dropped by 12.34% from producers’ price index before the harvest. If in percentage decreased by 18.8%. Surely the decline in the price of this grain causes a decrease in the overall producers’ price index as a result of 18 previous farmers who are considered prosperous when viewed from his producers’ price index to 10 farmers at harvest time.

4.2. The results of producers’ price index differences between non-harvest and great harvest.

From result of SPSS obtained that significance value equal to 0.00, this value less than 0.05 so significant value / P - Value <0.05; Then H1 is accepted. This means that there is a real difference between non-harvest farmers' producers price index and harvesting. This result is obtained with Confidence interval 95%.
Table 4. Output results SPSS mean different test (paired samples) non harvest producers price index greater and great harvest

| Description                                      | Mean  | t    | Df | Significance |
|--------------------------------------------------|-------|------|----|--------------|
| Non Harvest producers price index and great Harvest | 2.34194 | 11.091 | 97 | 0.000        |

5. Conclusion
The rice commodity harvest affects the Producers price index. Producers price index at harvest time is lower than non-harvest, so that farmer's welfare during harvest time is decreasing seen from decreasing of producers’ price index of the rice farmer. Low producers price index due to high harvest resulted in decreasing consumption of home staple foods.

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