Effects of Channel Power on Price Fluctuation of Agricultural Products: Empirical Evidence from China

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Keywords: Channel power, Circulation industry, Agricultural products’ price, Information system.

Abstract. Based on the provincial panel data of China from 2008 to 2016, this paper makes an empirical study on the relationship between channel power and price fluctuation of agricultural products. The results show that: Channel power has a significant impact on price fluctuation of fresh agricultural products. Specifically, relative scale power has a significant positive effect on the price fluctuation of fresh agricultural products, and relative operation power has a significant negative effect on the price fluctuation of fresh agricultural products, while channel power has no significant effect on the price fluctuation of grain agricultural products. Therefore, it is necessary to optimize the structure of the circulation industry of agricultural products.

Introduction

In recent years, the phenomenon of price “roller coaster” and the phenomenon of “cheap selling and expensive buying” in China’s agricultural products market have aroused widespread concern. The irrational fluctuation of agricultural products’ price has a great harm to the benign development of agriculture, the growth of farmers’ income, the stability of commodity price and the harmony of social order. The imbalance between supply and demand, hot money speculation, monetary factors and the financialization of agricultural products are regarded as the main reasons for the sharp fluctuations of agricultural products’ price. However, as a link between production and marketing, what role does the circulation play in this process? Studies have shown that there is an unequal market power between retailers and wholesalers (Zhu Qin, 2013). Will such an unequal market power affect the price fluctuation of agricultural products? This is a question to be investigated deeply.

Scholars have not reached a consensus on the impact of market power of distributors on price fluctuations of agricultural products. On the one hand, some scholars believe that in the field of agricultural products, distributors have certain scale power and information advantages, in order to obtain greater profits, may aggravate the fluctuation of agricultural products prices. The main viewpoints are as follows: the development of large-scale circulation enterprises makes the circulation field more and more concentrated, the monopoly power of circulation enterprises gradually forms in the agricultural product market, especially the concentration degree of large-scale grain processing industry is significantly increased, and the scale power of these enterprises will have certain ability to manipulate the market price, thus affecting the fluctuation of agricultural products’ price. (Zhang Xiao-min et al. 2012). Compared with small-scale producers of agricultural products, distributors have obvious information advantages, enabling them to use information power to achieve asymmetric transmission of agricultural prices (Guo Li-jing et al., 2014). In order to achieve excess profits, distributors may aggravate price fluctuations of agricultural products.

On the other hand, some scholars believe that in the market of agricultural products, the market power of the distributors is small, cannot control the price fluctuation of agricultural products, and may even calm the price fluctuation. The representative viewpoints are as follows: For fresh agricultural products such as vegetables and fruits, they are mostly circulated through the channels of farmers’markets or supermarkets which are almost in a state of complete competition market (Hu
Bing-chuan et al., 2011). Moreover, in the circulation of vegetables and fruits, the concentration of processing enterprises has not increased significantly, the influence of monopoly power is very small (Guo Lijing et al., 2014). Some studies have shown that retailers may be reluctant to raise retail prices of perishable commodities, such as pork and vegetables, in order to avoid economic losses caused by deterioration when wholesale price increases. (Wang Sishu et al., 2010). At the same time, in order to improve their profit level, retailers may take advantage of information asymmetry, without reducing the retail price or the price reduction is less than the wholesale price reduction when wholesale price falls (Zhu Qin et al., 2013). The retailers have played a certain role in smoothing the fluctuation of the retail price of agricultural products.

The existing research results are more fruitful, which has a great inspiration for this study. This paper mainly focuses on the impact of circulation on the price fluctuation of agricultural products. In this respect, there is still much room for further study. The influence of circulation on the price fluctuation of agricultural products and its mechanism have not been finalized, and further systematic analysis is still needed; The research on the influence of channel power on the price fluctuation of agricultural products mostly stays in the normative theoretical analysis, lacking empirical research support. This paper intends to make a thorough study of the relationship between the market power of the distributors and the fluctuation of agricultural products’ price from both theoretical and empirical aspects.

**Hypothetical Proposition**

**Concept Definition**

Channel power refers to the market power of distributors (wholesalers and retailers) in circulation channels. Market power refers to the ability of market participants to influence commodity prices. What are the sources of market power? Zhu Qin (2013) argues that “for industries or enterprises, market power comes mainly from three sources: the advantages of the enterprise, such as market share, product differences, brand premium, technical barriers and channel control; government policies, such as government regulation policies, administrative barriers; market itself, such as spatial distribution of products, incomplete consumer information, etc.”

In China's agricultural products market, the market power formed by product difference, brand value, technical barrier and government regulation is not obvious to the distributors. Therefore, this paper summarizes the channel power of the distributors into two aspects: scale power, which is the market formed by the distributors' own scale, and operation power, which is formed by the advantages of the circulators in terms of their organizational degree, management ability, information acquisition and utilization ability.

Compared with researching the effect of the channel power of the distributor on the price formation, this paper argues that the study of the influence of the relative market power between the wholesaler and the retailer on the price fluctuation of agricultural products has more theoretical and practical significance. Therefore, this paper mainly studies the relative market power of wholesalers and retailers, and further divides the relative market power of wholesalers and retailers into relative scale power and relative operation power.

**Mechanism Analysis**

In China's agricultural products market, the sales scale of wholesalers is larger than that of retailers, which means that the scale power of wholesalers is higher than that of retailers. Based on the fact that the prices of agricultural products in recent years fluctuate sharply in China's agricultural products market, it can be assumed that the relative scale power of wholesalers aggravates the price fluctuation of agricultural products.

This situation can be explained in two ways: on the one hand, when the agricultural products’ price rises, wholesalers use their relative scale power to make wholesale prices rise more than production prices to pursue greater profits. In this case, the formation of price is not only determined by supply...
and demand, but also due to the existence of the relative market power of wholesalers. This has led to sharp fluctuation of agricultural products’ prices.

On the other hand, when the wholesale sector controls the circulation market of agricultural products, the market power of wholesalers and retailers varies greatly. Traditional wholesalers can also benefit greatly by relying solely on extensive development (Wang Xiaodong et al., 2011). They are often reluctant to invest more energy and money in improving business environment and service quality. Therefore, it leads to the inefficiency of the market operation in the wholesale sector of agricultural products, and has a negative impact on the price fluctuation of agricultural products. Based on this, the research hypothesis can be put forward.

**Hypothesis 1:** the larger the relative scale forces, the greater the price fluctuation of agricultural products; vice versa.

Previous studies have shown that retailers have a certain stabilizing effect on the price fluctuation of agricultural products, and the fluctuation range of production price is obviously smaller than that of retail price. Therefore, the main reason for the sharp fluctuation of agricultural prices is probably in the wholesale sector. More than 70% of China’s agricultural products participate in circulation through the wholesale market of agricultural products. The wholesale market plays a leading role in the circulation of agricultural products (Huang Fuhua et al., 2017). It undertakes many functions such as commodity distribution, price formation, information transmission, supply and demand regulation (Zhang Chuang et al., 2015). Therefore, it has comprehensive operational capacity. Force has great influence on the circulation market of agricultural products.

With the continuous development of large-scale chain supermarkets and fresh supermarkets in China’s circulation field, the degree of organization of agricultural retailers is getting higher and higher, while the development speed of wholesale links is relatively slow, and the overall management level is low. The higher the degree of circulation organization of wholesalers is, the new circulation functions such as logistics integration, market development, quality monitoring and information integration (Olsson et al., 2013), which can effectively regulate the fluctuation of agricultural prices. Based on this, the research hypothesis can be put forward.

**Hypothesis 2:** the larger the wholesale and retail operation force is, the smaller the price fluctuation of agricultural products is, and vice versa.

**Model Specification**

To test hypothesis 1, the panel data model is used for econometric analysis, and the model can be expressed as:

\[ \ln \text{Cons Price}_{it} = \beta_0 + \beta_1 \text{ScalePower}_{it} + \beta_2 \text{OperaPower}_{it} + \beta_3 X_{it} + \epsilon_{it} \]  

(1)

Among them, \(i\) denotes provinces and \(t\) denotes years, and the interpreted variables in \(\ln \text{Cons Price}_{it}\) in the model are logarithms of agricultural retail price index. The explanatory variables \(\text{ScalePower}_{it}\) are wholesale and retail relative scale forces, \(\text{OperaPower}_{it}\) are wholesale and retail relative operation forces. \(X_{it}\) are the control variables. This paper chooses the logarithm \(\ln \text{Prod Price}_{it}\) of agricultural product price index as the control variable, because the focus of this study is to investigate the influence of channel power on the price fluctuation of agricultural products, rather than to study the influencing factors of the price fluctuation of agricultural products, and the price index of agricultural products reflects agriculture to a large extent. The impact of supply-demand relationship in the product market can also control the impact of inflation, so the price index of agricultural products production is an ideal control variable.

To test hypothesis 2, set the following econometric models:

\[ \ln \text{Cons Price}_{it} = \beta_0 + \beta_1 \text{CircEffic}_{it} + \beta_2 X_{it} + \epsilon_{it} \]  

(2)
The explanatory variables CircEffic in the model are commodity circulation efficiency. The meaning and setting of other variables are the same as model (1).

**Data Collection**

Considering the availability of data, variables can be represented by the following data: (1) relative scale forces (ScalePower). The ratio between average sales class value of wholesale and retail enterprises can be expressed. Specific formulas are as follows: relative scale power (ScalePower) = {sales value of wholesale commodities above quota/number of legal persons of wholesale enterprises above quota (agricultural, forestry and animal husbandry products)} /{sales value of wholesale commodities above quota/number of legal persons of retail enterprises above quota (comprehensive retail)}. (2) relative operation forces (OperaPower). The relative operation forces is expressed by the ratio of the degree of organization of the wholesale industry to the degree of organization of the retail industry. The specific calculation formula is as follows: the relative operation power of wholesale and retail enterprises (OperaPower) = (the turnover of wholesale markets of commodities above 100 million/ the total sales of commodities of wholesale enterprises above the quota)/(the total sales of commodities of chain retail enterprises / the total sales of retail enterprises above the quota).

This paper uses the provincial panel data from 2008 to 2016. Due to the lack of some data in Tibet and Qinghai, the actual data of 29 provinces are 261.

**Results and Discussion**

From Table 1, we can see that the estimated results of fresh agricultural products such as vegetables, fresh fruits and aquatic products are significant at different levels. The relative scale power have a positive impact on the price fluctuation of fresh agricultural products, while the relative operation power have a negative impact on the price fluctuation of fresh agricultural products, which is consistent with the above theoretical assumptions. Relative scale power and relative operation power variables are not significant, indicating that channel power has no significant impact on price fluctuation of grain agricultural products. The corresponding explanation lies in the implementation of grain storage system and minimum purchase price policy for grain agricultural products in China. Such administrative intervention reduces the impact of circulation channel operators on grain prices. Even if the channel merchants have the ability to influence the sharp fluctuation of food prices, the stability of food prices is related to social stability, so the channel merchants dare not touch the legal bottom line that endangers social stability, and the channel forces have no significant impact on the price fluctuation of grain agricultural products.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Dependent variable (farm product retail price index)</th>
<th>V e g e t a b l e s</th>
<th>F r e s h f r u i t s</th>
<th>A q u a t i c p r o d u c t s</th>
<th>G r a i n s</th>
</tr>
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<tr>
<td></td>
<td>FE</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>ScalePower</td>
<td>0.0014**</td>
<td>0.0022*</td>
<td>0.0012*</td>
<td>0.0007</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.0436)</td>
<td>(1.5102)</td>
<td>(1.7489)</td>
<td>(1.1832)</td>
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</tr>
<tr>
<td>OperaPower</td>
<td>-0.0150**</td>
<td>-0.0141*(-2.0823)</td>
<td>-0.0023*(-1.8946)</td>
<td>0.0006</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(-2.2347)</td>
<td>(-1.8946)</td>
<td>(-1.8946)</td>
<td>(0.1542)</td>
<td></td>
</tr>
<tr>
<td>ProdPrice</td>
<td>0.5832***</td>
<td>0.3482***</td>
<td>0.4073***</td>
<td>0.6742***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5.9574)</td>
<td>(5.8437)</td>
<td>(7.0349)</td>
<td>(21.8542)</td>
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<tr>
<td>Constant term</td>
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<td>3.2947***</td>
<td>2.4755***</td>
<td>1.8432***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4.3595)</td>
<td>(5.6880)</td>
<td>(10.4197)</td>
<td>(10.3088)</td>
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<td>Province</td>
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<td>Control</td>
<td>Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Year</td>
<td>Control</td>
<td>Control</td>
<td>Control</td>
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<tr>
<td>Total Significance</td>
<td>FE(F)</td>
<td>5.7832***</td>
<td>16.2472***</td>
<td>4.4749***</td>
<td>15.3875***</td>
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<tr>
<td></td>
<td>Hausman</td>
<td>7.21*</td>
<td>6.89*</td>
<td>5.51*</td>
<td>6.28*</td>
</tr>
</tbody>
</table>

Note: (1) the numbers in brackets are t values. (2) **,***, respectively indicated significant level P values below 15%, 10%, 5% and 1%.

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Summary
This paper makes an empirical study on the relationship between channel power and price fluctuation of agricultural products. The results show that: Channel power has a significant impact on price fluctuation of fresh agricultural products. Specifically, relative scale power has a significant positive effect on the price fluctuation of fresh agricultural products, and relative operation power has a significant negative effect on the price fluctuation of fresh agricultural products, while channel power has no significant effect on the price fluctuation of grain agricultural products. Therefore, it is necessary to optimize the structure of the circulation industry of agricultural products agricultural products.

Acknowledgement
This research was financially supported by Heilongjiang Philosophy and Social Science Foundation (18YJC255 and 18JYE649), the National Social Science Foundation (16BJY125), and Humanities and Social Sciences Research Projects of China's Ministry of Education (18YJC790178).

References