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# Overview of Studies on Vertical Price Transmission of Agro-products

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**Abstract** Research on price transmission in vertically markets models the various price data, production index, consumer index and expectations index to proof market integration relations and estimate price transmission cycles, as well as to find out its function mechanism. Thanks to the development of market integration theory, research in this field explored well-rounded metric models. And the main research results are very closely to. To build up systematic models to input more variables based on demand and supply function, and remove the assumption of constant returns to scale of enterprises involving marketing and fully competitive market would be the development direction in this field. In this way, models draw close to the truth of economic operations.

**Key words** Price transmission, Vertical market, Research overviews

## 1 Introduction

With the implementation of grains purchase and sales system and the deepening of market reform, the price of agro-products is gradually on the decisions of market. In recent years, the agro-products price experienced great fluctuations both at home and abroad, firstly in the year of 2009 when the price of some agro-products increased to new records continuously, especially the international price of wheat and maize doubled; then in 2010 when the increased increasing trend of agro-products price was becoming very severe. However, the increase of agro-products price didn't bring the farmers the expected benefits. In 2011, the yield of agro-products in China increased magnificently, which, however, resulted in the poor sales of some products, including the celery of Henan Province in April, 2011; the cabbage, carrots, garlic and ginger of Jiangsu Province in May; the bananas in Hainan Province in July; the grapes, litchi and longan of Guangdong and Guangxi Provinces in September; the potatoes and onions of Ningxia, Inner Mongolia and Hebei Provinces whose purchase price slumped in October.

Under this condition, the scholars and government officers from both at home and abroad start to focus their studies and debates on several factors, including the market expectation, crop planting area, products circulation, products storage, preservation and marketing, monitoring and forecast of price, money supply, changes of supporting financial policies, improvement of agricultural comparative benefits, *etc.*, hoping to find out the causes to the asymmetric transmission of vertical price.

## 2 Problems of vertical market price transmission

The vertical price transmission of agro-products refers to the price changes during the vertical processes of agro-products, covering their production, purchase, circulation, wholesales and retailing. The price changes are related to each link and result in the redistribution of profits. Characterized by scattered management, backward market system and low organizational degree of farmers, the field purchase price of agro-price is vulnerable to external influence. On the one hand, when the price increases, the farmers cannot enjoy the profits brought by price increase due to the oligopolistic position of sellers; but on the other hand, when the price decreased magnificently, the farmers still can't gain profits because they should carry the responsibility for the slow sales of agro-products. All in all, the vertical market price transmission of agro-products will not only bring some serious impact on agricultural production, but also greatly discourage the farmers.

From the perspective of agricultural and rural development, the increased uncertainties and risks under market mechanism greatly decrease the economic and social benefits of new agro-products sales system. It can not be denied that both agricultural and rural development is under greater constraints of market<sup>[1]</sup>. The price of some horticultural products, which completely depends on market adjustment, fluctuates frequently, especially that of vegetables and fruits, which determines that the farmers' income is quite unstable<sup>[2]</sup>, and has become one of the important obstacles to the steady increase of agricultural yield and the stable improvement of farmers' incomes<sup>[3]</sup>. From the perspective of agro-products market development, the supply efficiency of agro-products is quite low in different seasons and different regions, and the products price may be deliberately uplifted during the purchase, processing, wholesales and retail processes to gain more profits. The risks of price fluctuations will be increased by market force, incomplete market, the parts involved in transform of agricultural management, policies encouragement and direct intervention<sup>[4]</sup>.

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From the perspective of agro-products circulation, both the transmission efficiency and transmission period of vertical market price lag, reflecting the bad vertical connection and low circulation efficiency. From the perspective of price regulation, only by discovering the price transmission at each link and the profits distribution mechanism can some effective measures like the dispatch of substitutes or stock be taken to conduct effective price intervention. However, it is still difficult to carry out a detailed analysis on how each factor influences the price transmission and how much their contribution rates. The present system about the dynamic monitoring of agro-products costs, wholesales price and retailing price still needs to be improved and upgraded.

### 3 Characteristics of vertical price transmission

The studies of vertical price transmission have always been carried out from two directions, the research of its characteristics and the interpretation of its theory. The former means to find out the characteristics of vertical price transmission, inspect market relations, and estimate the vertical transmission speed by the means of econometric test of various price data, production exponent, consumption exponent and expectation exponent. Compared with the latter, the former pays more attention to the discussion of practical problems.

#### 3.1 The econometric model already used is more mature

The study of vertical price transmission characteristics benefits from the development of market integration theory, and the econometric test method commonly used is based on the Granger causality test, Johansen test and error correction model. The price of agro-products in China was experiencing great fluctuations since 2008, when a great many research papers using the above models to study price transmission appeared. For example, Ning Wang, *etc.*<sup>[5]</sup> tested the integration of wheat purchase market and flour retail market in North China by Johansen co-integration test and error correction model; Jiafu Liu, *etc.*<sup>[6]</sup> studied the price transmission of domestic soybeans and soybean oil market by the vector autoregression model; Shiwei Xu, *etc.*<sup>[7]</sup> studied the price transmission between the production and sales of agro-products by the vector error correction model, pulse response function and variances decomposition. The theoretical sources of all above studies come from the development of market equilibrium theory and market integration theory. The market integration inspects the price relations of different markets, studies how the supply-demand relations at one link is transmitted to other links, and then analyzes how the price at each link influences the speed and degree of adjustment. Thereafter, the Granger causality test expands the studies of static price relations to dynamic price relations. Sims<sup>[8]</sup> used the vector autoregression model to imitate the dynamic influence of random perturbation on variables in 1980, and in the following thirty years, great achievements were made in the fields of domestic and international market integration and the symmetry of price transmission.

**3.2 The study results are basically consistent** The study re-

sults on vertical price transmission are basically consistent both at home and abroad, and the price transmission has several characteristics as follows: firstly, there is a long-term integration in the domestic market of main agro-products and a short-term adjustment between the domestic and international prices of some agro-products. The long-term integration of the domestic and international prices of some products, including cereals, such as rice, maize and wheat, cotton, animal husbandry products, such as pigs, beef and aquatic products, has been tested by the econometric model, but the integrative degree of each market is not completely the same. The market integration is resulted from the price transmission brought by direct marketing, or the price input brought by indirect marketing, or the changes of international market supply and demands. Secondly, the construction of sales system is beneficial to improve the transmission efficiency of market price and shorten the slow sale period. Generally, the sales system can reduce transaction prices, regulate circulation market, improve circulation efficiency, prevent the speculations, upgrade the market integration, thus make it possible for the price to rapidly transmit during the processes of production, purchase, wholesales and retails. Thirdly, in domestic market, the price of some horticultural products, such as vegetables and fruits, is influenced more by the buyers than by the sellers, and the retail price is influenced more by the increase of wholesales price than by the decrease. The results have been proven by the studies both at home and abroad, which, from the viewpoints of researchers, is related to the strong seasonal and perishable characteristics of horticultural products, as well as the great loss caused by long transport distance.

#### 3.3 The influencing factors of price transmission is further expanded

Given that the study of vertical market price transmission relies on the model adopted, test method, the economic environment of market as well as the data frequency, sampling method and statistical technique used, the experts, in order to obtain more objective results about market price relations and price transmission features, use diverse indexes to quantify the important factors of price transmission thanks for the innovation and emergence of some latest statistical indexes. The important factors influencing the price transmission are divided into three categories: policy factors, including the tax policies, subsidies policies, supportive policies for production, trade promotion policies and trade barriers; circulation factors, including the participation of farmers' cooperatives in marketing, price and efficiency of sales agents, operation system of market-directed economy, government interterrene, multi-party consultation system, *etc.*; unpredictable factors, including climate, economic fluctuations, external disturbance, *etc.*. It should be noted that the traditional studies include the expectation of producers in the important factors affecting supply based on the cobweb model and the theory of producers adaptive expectations, while the latest studies involve the indexes of consumption confidence and economic sentiment in the econometric model as the substitute variables of consumption expectation, and test the indexes as the important factors affecting the demands change.

#### 4 Theoretical interpretation of vertical price transmission

Compared with the study of characteristics, the interpretation of theories not only concerns which transmission link plays an decisive role in price and what characteristics the transmission has, but also aims to find out the causes and mechanism of price transmission and then prove and deduce them with models. Similar to other economic theories, the study of price transmission is primarily under strict assumptions of constant returns to scale of enterprises involving marketing and fully competitive market, Gardner<sup>[9]</sup>, with the aid of Equilibrium Displacement Model developed by Muth<sup>[10]</sup> in 1964, deduced an elastic price transmission formula between the purchase of agro-products and the retail of food in 1975. Thereafter, in order to be closer to the practical economic operations, Holloway<sup>[11]</sup> and McCorriston<sup>[12]</sup> loosened up the consumption of completely competitive market at the food retail link, and then McCorriston<sup>[13]</sup> released the consumption of constant returns to scale of enterprises involving marketing, and deduced a new elastic formula in 2001. In 2004, based on the previous studies, Weldegebriel<sup>[14]</sup> established a price transmission model between the purchase of agro-products and food retail under the conditions of incomplete competition. In 2007, Xiuqing Wang<sup>[15]</sup> not only loosened up the assumption of completely competitive economy, but also removed the consumption of constant returns to scale, and exposed the price transmission features between the purchase of agro-products and food retail under the confluence of scale economy and market force. As is indicated by the results, the more loosened up the consumption, the closer the model to practical economic operations, which means that the returns to scale and market force produce complex interactions on price transmission, thus it is hard to deduce general elastic formula and conclusions. The features of transmission depend on not only the concrete forms of agro-products supply functions and food demand functions, but also extent of market force changes at the links of agro-products purchase and food retails under the external influence.

#### 5 Research direction of vertical market price transmission

The studies of vertical market price transmission are always influenced by the low frequency of price data and the difficult quantification of external influence. From the perspective of theoretical study, the influence of market force on price transmission is necessarily the same under different market environment in different countries. Thus, in this field, it needs not only the fundamental

theoretical deduction and evidence, but also the interpreter and researcher of practical problems. In China, the studies of vertical market price transmission are more complex and difficult, for example, the agro-products price monitoring system in China is still underdeveloped, the information of suppliers and demanders cannot be smoothly transmitted, the price information with high frequencies is hard to be collected; the participative parties in agro-products purchase increase, the marketing input improves, the marketing enterprises, agents and even the farmers join the marketing; the influence of tax system, money policies, supportive policies for production and trade policies is gradually improved. As are shown in the studies of price transmission in latest fifty years, based on the existing vector autoregression model, Markov regime switching model, threshold cointegration theory, equilibrium mobile model, finite distributed lag model, the future study will orient at the construction of a systematic model for practical test. The systematic model, on the basis of supply and demand functions, will include more variables, remove strict assumption, and explore the essence of price transmission.

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