Pricing Power of Agricultural Products under the Background of Small Peasant Management and Information Asymmetry

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Abstract From the background of small peasant management and information asymmetry, this paper introduced the middle profit sharing model and discussed influence factors and ownership of pricing power of agricultural products. It obtained following results: (i) the transaction scale has positive effect on farmer's pricing power of agricultural products, while the competitor's transaction scale has negative effect on it, so does the cost for information search; (ii) under the condition of small peasant management system, farmer is in a relatively weak position in the distribution of pricing power of agricultural products, due to factors such as small transaction scale, information asymmetry and farmer's weak negotiation ability; (iii) through cooperative game, farmer and buyers can share cooperative surplus at the agreed ratio; (iv) the introduction of self-organizing specialized farmers cooperatives is favorable for solving the problem of pricing power of agricultural products, and possible problems, such as "collective action dilemma" and "fake cooperatives" in the cooperative development process can be solved by internal and external division of labor and specialization of cooperatives.

Key words Small peasant management, Information asymmetry, Pricing power, Middle profit, Transaction cost

1 Introduction

Income of farmers is the core of three rural issues. Slow growth in farmers' income from household business is the major reason for slow growth of total income[1]. The Household Contract Responsibility System implemented more than 30 years ago has brought great leap in agricultural productivity, but it also poses problems such as decentralization of land ownership, fragmentation of farmland, and small scale[2]. In such institutional arrangement, small peasants have to face the market independently. When participating in transaction of agricultural products, they lack sufficient information and knowledge, and also lack right of speech and negotiation ability. Besides, government and enterprises often use nonmarket forces to expel small peasants from circulation system of agricultural products, so small peasants always remain the deprived situation and fail to share benefits of socialized labor division[3].

From pricing of agricultural products completely by government in the period of planned economy to gradual opening of price of agricultural products in the price reform of 1985, China's agricultural products have completed the transformation from planned pricing to market pricing[4]. Besides, as producers and suppliers of agricultural products, farmers have greater and greater influence on pricing of agricultural products with advance of price reform. This will play a huge role in promoting increase of farmers' income and raising farmers' enthusiasm for production. However, China's agricultural production has changed from resource restraint to resource and market restraint. In this situation, farmers shoulder heavy duties of production and sales. Sharp fluctuation in price of agricultural products in recent years is almost accompanied with economic and social problem of "cheap grain harming farmers". It reflects sharp conflict between small peasant and big market, farmers still lack necessary influence power in pricing of agricultural products, and fail to effectively guarantee their benefits. Therefore, it is urgent to solve theoretical and practical problems such as factors influencing pricing of agricultural products, status of farmers in allocation of pricing of agricultural products, and ways to protect benefits of farmers in pricing of agricultural products.

2 Research hypotheses

Theoretically, market price of agricultural products is determined by their real value. Under the influence of supply-demand relationship, price of agricultural products will fluctuate automatically around their real value. Here, there are three potential hypotheses: information symmetry, perfect competition, and zero transaction cost. However, in real world of transaction of agricultural products, neither hypothesis can be satisfied: market of agricultural products always stays in information asymmetry, imperfect competition, and high transaction cost. Factors influencing bargaining ability of transaction parties mainly include transaction volume (transaction scale), market competition, product differentiation, information grasping degree, and other factors such as importance of agricultural products for transaction parties. As to agricultural products, the conclusion of transaction agreement (namely, the realization of price) is not only influenced by the above factors, but also influenced by characteristics of transaction parties, such as knowledge and skills. Through single or repetitive bargaining, transaction parties finally reach balance point of game. The signature of agreement is deemed as determination of price of agricul-

tural products, and it means completion of allocation of pricing power of agricultural products. Therefore, the ownership of pricing power of agricultural products is influenced by bargaining ability and characteristics of transaction parties, and reflected in agreements signed by transaction parties.

Hypothesis 1: transaction scale, market competition, product differentiation, information grasping degree, knowledge and skills of dealers have direct influence on pricing power of agricultural products. The ownership of pricing power of agricultural products can be deduced from transaction contract.

Inherent weakness of small peasant management greatly influences allocation of pricing power of agricultural products. Limited by household contract responsibility system, management scale of each family is limited and decentralized, far from reaching the effect of scale economy. Compared with wealthy buyers, single farmers have few agricultural products for transaction, and can not form supply pressure for buyers, thus farmers have no ability of raising price. From the perspective of institutional economics, special purpose of input of land, machinery, and human capital and sales of agricultural products determines high level of special purpose of assets in the field of agricultural products. High level of special purpose of assets brings huge market risk for farmers, and buyers have the advantage of overcharging farmers. The gap between powerful buyers and weak farmers leads to information asymmetry between transaction parties, relatively great disparity in bargaining ability, as well as distortion of transaction balance[5].

Hypothesis 2: in the comprehensive action of small peasant management and information asymmetry, farmers remain relatively weak position in allocation of pricing power of agricultural products.

3　Factors influencing pricing power of agricultural products

3.1　Mathematical description of pricing power of agricultural products
Suppose unit production cost of agricultural products is c_1, the unit purchasing price paid by buyers for farmers is p_1, unit wholesale price paid by retailers for buyers is p_2, unit apportioned cost incurred by buyers in the process of packaging, transportation and storage is c_2, suppose the market demand is only sensitive to wholesale price of agricultural products, the demand function D of certain agricultural product can be simply represented as the function of wholesale price p_2, i.e. $D = Ap_2^{-k}$, $k > 1$, where A and k are constants. Different from industrial products, agricultural products have different levels of consumption in every link of the circulation. Considering the consumption, the quantity of agricultural products sold by farmers to buyers is not equal to the quantity of agricultural products bought by retailers from buyers, which increases the complexity of the model. For the convenience of study, we suppose the intermediary consumption in circulation of agricultural products is zero. Then, the middle profit can be defined as net profit generated from circulation of unit agricultural products and can be expressed as:

$$R = (p_2 - c_2 - c_1)Ap_2^{-k} \tag{1}$$

The middle profit obtained by farmers is:

$$R_1 = (p_1 - c_1)Ap_2^{-k} \tag{2}$$

The middle profit obtained by buyers is:

$$R_2 = (p_2 - p_1 - c_2)Ap_2^{-k} \tag{3}$$

Pricing power of agricultural products is the power of speech of transaction parties in pricing of agricultural products, also the bargaining or price negotiation ability of transaction parties for agricultural products. Such negotiation ability runs through the whole process of bargaining game and is reflected by transaction contract. The middle profit is result of performance of transaction contract. Thus, the bargaining ability b can be defined as the ratio of middle profit of transaction parties. Then, farmers' pricing power of agricultural products can be expressed as:

$$b_1 = \frac{R_1}{R_2} = \frac{p_1 - c_1}{p_2 - p_1 - c_2}, b_1 > 0 \tag{4}$$

The formula (4) is mathematical description about ownership of pricing power of agricultural products from the perspective of allocation of middle profit, but it does not reflect the bargaining game process. According to formula (4), the higher value of b1, the more profit of farmers, and the greater the pricing power of farmers. When $b_1 = 0$, i.e. $p_1 = c_1$, farmers are break-even and have no profit; when $0 < b_1 < 1$, the control ability of farmers over price of agricultural products is restricted and farmers lack pricing power of agricultural products; when $b_1 = 1$, i.e. $R_1 = R_2$, farmers and buyers have the same influence power for price of agricultural products and allocation of pricing power of agricultural products is balanced; when $b_1 > 1$, farmers take up dominant position in allocation of pricing power of agricultural products, and along with increase of the value, the dominance is constantly increasing, when b_1 is infinitely great, farmers have complete control ability over price of agricultural products; theoretically, there is the condition of $b_1 < 0$, in other words, when a transaction party is deficit, he will exit from the market and the transaction will fail to continue. Therefore, we suppose $b_1 > 0$ in this study.

3.2　Model of factors influencing pricing power of agricultural products
Information plays an important role in pricing of agricultural products. Price of agricultural products depends on behavior of different transaction individuals in agricultural product transaction model, while the decision of individual transaction behavior is based on information each individual possesses. Therefore, information search cost id a non-typical exogenous variable determining the pricing power. Suppose the information search cost of farmers is C, transaction quantity of agricultural products is Q, the precondition for farmers choosing to deal with buyers is the transaction gain (i.e. the transaction surplus) is greater than the income of entering the market independently. Therefore, we obtain the constraint for conclusion of transaction:

$$(p_2 - c_1 - c_2) - C/Q \leqslant p_1 - c_1 \tag{5}$$

In small peasant management system, due to limitation of transaction scale, individual farmers have to fluctuate according to market conditions when independently entering the market, farmers com-

pletely become accepters of price and obtain the whole net profit of transaction, namely, $R_1 = p_2 - c_1 - c_2 - C/Q$. In fact, due to existence of Diseconomies of Scale, compared with buyers, individual farmers will pay higher transaction cost in packaging, transportation and storage. For the purpose of calculation, we still suppose the transaction cost is c_2.

Through conversion, we obtain $p_1 \geqslant p_2 - c_2 - C/Q$, and accordingly obtain the certain condition for farmers choosing to deal with buyers:

$$p_1 = p_2 - c_2 - C/Q \tag{6}$$

Substitute formula (6) into formula (4), we obtain farmers' pricing power of agricultural products:

$$b_1 = \frac{(p_2 - c_1 - c_2)Q}{C} - 1 \tag{7}$$

From the demand function $D = Ap_2^{-k}$, we obtain $p_2 = A'D^{-1/k}$, where A' is constant and $A' = A\,1/k$. Under small peasant management system, farmers as sellers are in greater number and form the market supply. Transaction quantity of buyers and sellers is equal. From the sales volume (Q) of agricultural products of individual farmer, we obtain $D = \sum_{i=1}^{n} Q_i$, ($n \in N$). Suppose sales volume of agricultural products of a certain farmer is Q_t, $D = \sum_{i=1,i\neq t}^{n} Q_i + Q_t$, substitute into $p_2 = A'D^{-1/k}$, we get:

$$p_2 = A'\left(\sum_{i=1,i\neq t}^{n} Q_i + Q_t\right)^{-1/k} \tag{8}$$

In small peasant management system, due to limitation of transaction scale, the influence of individual farmer on price of agricultural products p_2 can be ignored, and price of agricultural products can be deemed as the function of supply volume of other farmers. Therefore, the formula (8) is equivalent to $p_2 = A'\left(\sum_{i=1,i\neq t}^{n} Q_i\right)^{-1/k}$, substitute into formula (7), we obtain:

$$b_t = \frac{\left[A'\left(\sum_{i=1,i\neq t}^{n} Q_i\right)^{-1/k} - c_1 - c_2\right]Q_t}{C} 1 - \tag{9}$$

From analysis of formula (9), farmers' pricing power of agricultural products is mainly influenced by three factors:

(ⅰ) Transaction scale Q_t. The transaction scale has positive influence on farmers' pricing power of agricultural products. The larger transaction scale brings the greater farmers' pricing power of agricultural products. Therefore, developing moderate scale management through innovating on many kinds of organization models exerts great positive effect on increasing farmers' income. At current stage, the state actively advocates developing many types of scale management and supporting development of new agricultural management system, which objectively reflects the policy requirement for strengthening farmers' pricing power of agricultural products.

(ⅱ) Transaction scale of competitors $\sum_{i=1,i\neq t}^{n} Q_i$. The transaction scale of competitors has reverse influence on farmers' pricing power of agricultural products. In reality, once supply volume of agricultural products is definite, if transaction scale of competitors is large enough, the influence of individual farmer on price of agri-

cultural products can be ignored.

(ⅲ) Information search cost C. Information search cost has reverse influence on farmers' pricing power of agricultural products. The information search cost is an essential part of transaction cost for agricultural products. Farmers' choosing the buyers is based on consideration of saving information search cost. When the information is asymmetry, farmers grasping more information will be favorable for raising their bargaining ability.

This proves the hypothesis 1.

4 Pricing power of agricultural products: middle profit sharing model

4.1 Middle profit sharing model   In the contractual relationship between farmers and buyers, both parties hope to maximize their benefits and restrain transaction action through specifying profit allocation relation in the contract. The competition for pricing power of agricultural products is finally reflected through contractual performance result. Therefore, the study on complex game relation of bargaining before transaction can be converted to analysis on the middle profit allocation after transaction and it is able to deduce the ownership of pricing power of agricultural products through contractual content. With reference to research methods of Yan Taihua and Zhan Yong, we can establish following middle profit sharing model[7]:

Calculate $\max_{p_2}(R)$. From the first order condition $\partial R/\partial p_2 = 0$, we can obtain the sales price of agricultural products at the maximal net profit $p_2 = \dfrac{k(c_1 + c_2)}{k-1}$. Similarly, we obtain the sales price of agricultural products at the maximal profit of buyers $p_2 = \dfrac{k(p_1 + c_2)}{k-1}$. Then, we obtain the condition for maximal net profit of buyers and circulation of agricultural products $p_1 = c_1$, the purchasing price of agricultural products is equal to production cost. At this time, profit of farmers is zero and transaction is closed.

To reach the transaction, buyers should cooperate with farmers. The specific method is to change the strategy of possessing the whole middle profit and share the cooperative surplus with farmers. Suppose the ratio of profit of farmers to the whole middle profit is r, namely, the farmers' profit after sharing is $R_1 = r \cdot \max_{p_2}(R)$, and profit of buyers is $R_2 = (1-r) \cdot \max_{p_2}(R)$. Because the strategy of pursuing maximal profit is not changed, the expectation condition of buyers changes to $\max(R_2) \leqslant (1-r) \cdot \max_{p_2}(R)$, as follows:

$$A\left[\frac{k(p_1+c_2)}{k-1} - p_1 - c_2\right]\left[\frac{k(p_1+c_2)}{k-1}\right]^{-k} \leqslant (1-r) \cdot A$$
$$\left[\frac{k(c_1+c_2)}{k-1} - c_1 - c_2\right]\left[\frac{k(c_1+c_2)}{k-1}\right]^{-k} \tag{10}$$

As rational economic men, farmers also pursue maximal profit. The expectation condition of farmers is:

$$A(p_1 - c_1)\left[\frac{k(p_1+c_2)}{k-1}\right]^{-k} \leqslant r \cdot A$$

$$\left[\frac{k(c_1+c_2)}{k-1}-c_1-c_2\right]\left[\frac{k(c_1+c_2)}{k-1}\right]^{-k} \tag{11}$$

Arrange formula (10) and formula (11), we can get:

$$\frac{(k-1)(p_1-c_1)(p_1+c_2)^{-k}}{(c_1+c_2)^{1-k}}\leqslant r\leqslant 1-\left[\frac{p_1+c_2}{c_1+c_2}\right]^{1-k} \tag{12}$$

From formula (12), on the basis of known information such as cost of agricultural products and demand function, it is easy to obtain the middle profit sharing ratio interval satisfactory to both parties. The purchasing price of agricultural products p_1 is the key for allocation of middle profit and also the focus for game between farmers and buyers. In the small peasant management system, due to influence of small transaction scale and weak negotiation ability of farmers, the formation of purchasing price of agricultural products always has the suspicion of forcing down the price[8]. Besides, there is hidden background that transaction parties possess incomplete information: farmers possess production cost information, while buyers possess circulation cost and demand information. Before the information becomes common knowledge, the key for bargaining is to possess information as much as possible. Besides, the ability of obtaining information is also different between farmers and buyers, so the information possessed by transaction parties is asymmetry. Therefore, the calculation of middle profit sharing ratio is win-win of the cooperative parties on the surface, but can not avoid having the coercive color, which is consistent with the hypothesis 2.

4.2 Potential hypothesis and drawbacks From the above analysis, we can see that the middle profit sharing model can not completely solve the problem of allocating pricing power of agricultural products and there are still many drawbacks. These drawbacks come from the potential hypothesis of the model. Namely, it supposes zero transaction cost, including the contractual signature cost before transaction and contractual performance cost.

Such potential hypothesis is obviously inconsistent with the transaction of agricultural products in the real world. Farmers choose to deal with buyers for the purpose of evading the high transaction cost of independently entering the market. Because there is friction between farmers and buyers in the transaction process, the parties should still face restrictive factors such as limited rational and opportunistic actions and uncertainty in the process of contractual signature and performance, and the transaction cost is unavoidable. In this situation, whether it is feasible to increase the explanation power of the model through relaxing the model hypothesis? Whether it is able to find out approaches for solving problem of allocation of pricing power of agricultural products on the basis of middle profit sharing model?

5 Pricing power of agricultural products: cooperative and specialized

5.1 Adhering to the road of farmers cooperatives Restricted by small peasant management system, many problems in the field of agricultural production and circulation are derived from rigid resource endowment conflict of large population but little land. Since it is impossible to change the small peasant management system in a short term, the solution to these problems will have to place hope on innovating upon organization model and raising the operating efficiency. In view of drawbacks of the middle profit sharing model, we recommend setting up specialized farmers cooperatives organized by farmers, internalizing transaction between farmers and buyers, and changing the transaction cost to agency cost and organization in-house management cost. Firstly, for buyers, the intervention of cooperatives can save and decentralize contractual signature and performance cost, and guarantee supply and quality of agricultural products and performance of orders; for farmers, the cooperation can realize large-scale obtaining, farmers can realize large-scale transaction through labor alliance, so as to raise bargaining ability and increase management income. Secondly, after intervention of cooperatives, farmers, cooperatives and buyers establish double principal agent structure. Cooperatives can make up deficiency of encouragement in the original principle agent relation between buyers and farmers. The problem of farmers' pricing power of agricultural products in essence becomes the principal agent problem between cooperatives and buyers.

5.2 "Collective action dilemma" and "fake cooperatives"
The introduction of specialized farmers cooperatives relaxes the potential hypothesis of middle profit sharing model and makes it closer to the reality, but there is certain problem. For example, the introduction of specialized farmers cooperative internalizes transaction between farmers and buyers, changes the transaction cost to agency cost and organization in-house management cost, but it is not certain which the transaction cost before the transaction and after the internalization is larger. As members of specialized farmers cooperatives, farmers have certain degree of differentiation and different farmers have different benefit demands and action choice[9]. Besides, large farmers and few rural elites often dominate operation of cooperatives relying on their advantages, leading to "elite capture" of cooperatives in various degrees. Besides, the "collective action dilemma" poses problem for internal management of cooperatives.

Specialized farmers cooperative is spontaneous choice made by rational small peasants for overcoming the conflict of connecting with big market. In practice, it is encouraged and supported by central government. From the perspective of institutional innovation, such interaction of induced and forced institutional change is objectively favorable for development of cooperatives, but government leading forced institutional change may lead to the North Problem due to government failure. However, some enterprises change to cooperatives through colluding with government, to get financial support and tax preference, leading to fake prosperity of agricultural cooperatives. The existence of "fake cooperatives" established not by farmers is extremely possible to lead to "lemon market" of development of agricultural cooperatives. As a result, real cooperatives are difficult to enjoy policy sunshine and preference and even exit from the market.

5.3 Labor division and specialization Although cooperatives established by farmers can effectively solve the problem of pricing power of agricultural products in theory, the "collective action dilemma" and "fake cooperative" bring about new problems. Without proper treatment, these will harm the solution to problem of pricing power of agricultural products and may take the development of specialized farmers cooperatives to a wrong road.

In view of these, we recommend implementing internal and external labor division and specialization of cooperatives. Firstly, farmers join in cooperatives with their land contractual management right, all farmland is delivered to cooperatives for unified management, forming the principal agent relationship based on the land contractual management right. In accordance with willingness and comparative management advantage of farmers joining in cooperatives, we divide farmers into professional managers, cooperative employees, and principals. Their labor will be divided as per the internal management mechanism of the cooperative. Therefore, the pricing of agricultural products between farmers and buyers completely changes the pricing of commodities between enterprises, inherent weaknesses of small peasant management expand their efficiency survival space because family management involves socialized labor division, and it further forms corresponding labor transaction and pricing mechanism[9]. In addition, income of farmers also changes to property income and wage income from original operating income, and is not subject to the problem of pricing power of agricultural products. Secondly, after internal and external labor division and specialization, agricultural cooperatives improve their special purpose of assets, but it also raises industrial threshold, increases access cost and action cost of "false cooperatives" and "fake cooperatives", and effectively restricts appearance of "lemon market".

6 Conclusions
(ⅰ) The transaction scale has positive influence on farmers' pricing power of agricultural products. The larger transaction scale brings the greater farmers' pricing power of agricultural products; the transaction scale of competitors has reverse influence on farmers' pricing power of agricultural products; information search cost has reverse influence on farmers' pricing power of agricultural products. When the information is asymmetry, farmers grasping more information will be favorable for raising their bargaining ability.

(ⅱ) Under the condition of small peasant management system, farmer is in a relatively weak position in the distribution of pricing power of agricultural products, due to factors such as small transaction scale, information asymmetry and farmer's weak negotiation ability.

(ⅲ) The middle profit sharing model makes it possible for win-win of farmers and buyers. Through cooperative game, farmers and buyers can share cooperative surplus at the agreed ratio.

(ⅳ) The introduction of self-organizing specialized farmers cooperatives is favorable for solving the problem of pricing power of agricultural products, and possible problems, such as "collective action dilemma" and "fake cooperatives" in the cooperative development process can be solved by internal and external division of labor and specialization of cooperatives.

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