International Journal of Applied Business and Economic Research

ISSN : 0972-7302

available at http: www.serialsjournals.com

Volume 15 • Number 23 (Part 2) • 2017

Middlemen Behavior in Vietnam's Traditional Food Distribution System: The Case of Upstream Market Power[1]

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ABSTRACT

Based on the Vietnamese case, this paper proposes a industrial organization model of the middlemen behavior in the traditional food distribution system for developing countries. This conventional system is often characterized by small farmers and of several retailer called middlemen which sell their products on market. Since most of works in this field has adopt an empirical approach, the focus of our study in this paper will be instead on theoretical model. In order to analyze this situation, we borrow several arguments from the theory of imperfect competition. We assume that middlemen have oligopsony market power in the upstream of the food system. We defined the consumer behavior by discrete choice model and study the quantity flow from small producers to the consumers by mean of Cournot competition.

JEL Clasification: Q25, C61, D61.

Keywords: Food Distribution, Imperfect Competition, Middlemen, Opligopsony Power.

1. INTRODUCTION

Viet Nam's traditional food distribution system was formed and developed through many stages. In recent years, the traditional system has been largely developed to deliver enough foods to the consumers. According to the Viet Nam's General Statistic Office, as 2011, there exists 8550 markets (traditional organized bazaar) in the whole country (General Statistic Office (GSO), 2012). There also exists numerous of traditional "street markets", and frog markets which can not be counted. This conventional system accounts for the majority

[1] This paper is based a part on my Phd dissertation which was undertaken at Aix Marseille University (Aix Marseille School of Economics, AMSE - GREQAM), France. I am grateful to my thesis advisor, Prof. Hubert STAHN for his guidance and wise advises.

of delivering agricultural products since it is currently nearly 90% of the food production distributed by this system in domestic market (see Mai and Cuong, 2009). In this system, the flow of foods basically moves from the farmers to the consumers through several collectors called the middlemen.

The behaviors of middlemen and the traditional distribution system has however some typical characteristics. Middlemen go around of farm fields to buy foods from farmers and sell these products in the traditional markets (see Wiersinga, 2004), which are characterized by having basic but poor conditions and sell products without really taking care to the quality of the products (see Maruyama and Trung2007, 2010, 2012). Because of acting as an intermediary between the farmers and the consumers, the behavior of the middlemen and their market power has an effect on both the wealth consumers and on the profit of farmers. Despite the fact that the middlemen is the key factor to deliver products from farmers to the consumers, they are, however, always thought to gain excessive profit from the farmers. Based on this observation, the objective of this paper is to study the behavior of the middlemen in the traditional food distribution system. Since most of food producers are small farmers who only exploit small lands (see Moustier *et. al.*, 2007and Hung P.V *et. al.*, 2007) and live in rural and pre-urban areas at commune level (see GSO, 2012), this paper focus on study middlemen behavior in the case of upstream market power. This case typically based on the fact that there are the large number of farmers, who just exploit in small part of land and live at commune level around the city (or pre-urban areas). On the other hand, there are not too much middlemen who transport foods to the cities to sell at competitive markets.

The subject of market power and middlemen behavior was studied in many literatures. Johri and Leach (2000) modeled the middlemen behavior on the relationship with the allocation of heterogeneous goods. Fingleton (2003) examined the competition among middlemen when buyers and sellers can trade directly. Robinstein and Wholinsky (1987) studied a model of a market with sellers, buyers, and middlemen, which highlighted the relation between the trading and the distribution of the gains from trade. Related to market power of middlemen, Chau, Goto and Kanbur (2007) studied on middlemen, non-profits, and poverty. They build the model of middlemen by using the Bertrand Benchmark competition. Merel, Sexton and Suzuky (2009) argued that high transport cost can be important reason which can be lead to middlemen's market power. The focus of our study in this paper will be on theoretically modeling the middlemen behaviors in the food market products low quality.

In the case of Viet Nam, there are several studies about the traditional retail system. Maruyama and Trung (2007) described the traditional retail system in Viet Nam, and point out the weak points of this system to compare with supermarkets. Wijk *et. al.*(2006) analyzed the characteristics of the traditional vegetable retail system in Ha noi, which describes the vegetable producers, the traders, and the location of bought these products. Wiersinga (2004) distinguished two types of collectors in Viet Nam, which are seasonal collectors and professional collectors. He observes that collectors go around of farm fields, negotiate the price, then transport and sell fruits and vegetables to the markets. P. Moustier *et. al.*(2007) described the trader of vegetables in Ha Noi, they emphasized that middlemen are responsible for collecting foods from different locations. Base on this observation, it is obviously that there has not yet the theoretically modeling of the middlemen behavior in the food markets of Viet Nam. This is reason why we propose a theoretical model of middlemen market behavior in the traditional food distribution system.

Since the intermediaries and their market powers are largely considerable in the food market(see Myers *et. al.*, 2010), McCorriston (2002), and Sexton and Lavoie (2001). The strategy of this paper is to borrow several arguments based on the theory of the imperfect competition. We assume that the middlemen have oligopsony market power in the upstream of the food distribution system[2]. This is typically the case of Viet Nam where middlemen buys foods from farmers, then transports and sells it to the consumer markets. Small farmers are characterized by a production function, and the consumer's behaviors is defined by a discrete choice model. The inverse demand function is introduced associated to Mussa - Rosen type of demand with vertically differentiated products (Mussas and Rosen, 1978). Since we introduce Counot competition, we assume that the middlemen are able to anticipate the effect of their demand or supply for fruits and vegetables on the prices that should be paid to the farmers. From this point of view, the middlemen market behavior is analyzed in the case of upstream market power.

Under such consideration, we construct the model of middlemen in the traditional food distribution system for developing countries typically based on the context in Viet Nam. Based on the optimal profit problem of middlemen in market competition, we characterize all the behavior of middlemen at market equilibrium in the case of upstream market competition. The result of trade quantities, the prices paid to the farmers and paid by consumers, and the profits of both farmers and middlemen at market equilibrium are point out to analyze the situation of the traditional food distribution in Viet Nam.

From that point of view, the paper is organized as following: the next section introduce the general assumption and notation, the third section model the behavior of benchmark case, the section four dedicate to the upstream market power, the fifth section discuss policy implication and finally the conclusion.

2. GENERAL ASSUMPTION AND NOTATION

2.1. The Traditional Food Distribution System

We assume that the foods, which middlemen sell on markets, are products with low quality. This is typically the case of Viet Nam, because: (i) the middlemen do not add more value for the products which they buy from farmers, and (ii) the traditional retail markets is described as market low quality by having basic conditions but normally without preserved equipment, lack of waste treatment systems, and without branded name. From that point of view, the food distribution system is described as following:

Farmers (producers) ------ Middlemen (collectors) ------ market low quality

In this system, we assume that there is only one level of intermediaries, and middlemen have relationship with both market sides of the food system. From that point of view, middlemen buy food from farmers with the quantity denoted by Q_m, they paid to farmers the food price P_{fm}. The quantity, which the middlemen sell at the final market low quality, denoted Q_ℓ. We assume that, middlemen will sell all the quantity which he buys from farmers to the consumers market. which implies that the quantity at final market must be equal to the supply of the farmers or in other word, $Q_\ell = Q_m$. Middlemen sell foods to the consumers with the price P_ℓ. Farmers obtain profit π_{fm}, and the wealth of middlemen remained when sell products to the market is denoted by π_m.

[2] For the important of oligopsony market power in Agricultural Market, readers can refer to Rogers Richard T. and Richard J. Sexton, (1994) (22)

2.2. Farmer and Food Production

We introduce N farmers supplying foods for the middlemen. A farmer is characterized by production function. Since a farmer is symmetric and products are homogeneous, the production function of a farmer is characterized:

$$q = f(\lambda) = \sqrt{\lambda}$$

With λ is denoted for the labor used which transform in fruits and vegetables. In this production function, we set normalization rule with the wage $w = 1$.

We now defined the inverse supply function of farmers. Farmers play the game: with P_{fm} is the price paid by the middle man, he will maximize their profit to optimal level of labor used in the production. A farmer obviously solves $\max_{\lambda} P_{fm} f(\lambda) - \lambda$. The optimal level of labor is therefore given by $\lambda(P_{fm}) = \left(\frac{P_{fm}}{2}\right)^2$ and the individual vegetable supply is $f(\lambda(P_{fm})) = \left(\frac{P_{fm}}{2}\right)$. Therefore, the total supply of vegetables $S_m(P_{fm})$ for the middlemen are respectively given by:

$$S_m(P_{fm}) = N\left(\frac{P_{fm}}{2}\right) \tag{1}$$

And the inverse supply functions is defined by:

$$P_{fm} = \left(\frac{2Q_m}{N}\right)$$

2.3. Middlemen, the Consumers and Demand for Low Quality Food

We introduce m middlemen indexed i. They are symmetric and characterized by a linear cost function with simply is the transportation cost. The cost function therefore is defined as following:

$$C_m(q_{m,i}) = C_m \cdot q_{m,i}$$

Since the traditional food market is described as market low quantity, and middlemen do not really taking care about the quality of the products, we define the willingness to pay by the low quality index which denoted by ℓ. Consumers at market low quality actually have two choices, they can buy low quality or do not buy the products. With the weight in the utility $\theta \in [0, K]$, if consumers buy low quality, the utility in this case is given by $U_\ell^\theta = \theta \,.\, \ell - P_\ell$, and if consumers buy nothing $U_\varnothing = 0$. From the utility function, of course we can consider that, the index low quality is larger than the cost of the middlemen in the natural way. Since K is the ranking of population who may enjoy to buy in market low quality, we have natural assumed that $\ell K > C_m$. This assumption implies that the willingness to pay must be large than the cost of the middlemen.

Let us now compute the demand for low quality, we obviously have two cases:

Case 1: Consumers buy nothing, since $\theta \in [0, K]$, we immediately observe, for $P_\ell > \ell K$, that for each individual θ, $\max\{U_\ell^\theta\} < U_\varnothing$, in other words, nobody wants to buy either low quality food.

Case 2: Demand for low quality when we take prices with the property that $P_\ell \leq \ell K$. Since the low quality good is increasing in θ, we identify the agent $\theta = \left(\frac{P_\ell}{\ell}\right)$ is indifferent between buy nothing or buy low quality.

But this requires that $0 \leq \theta \leq K$. Since the consumers are uniformly distributed on [0, K], the demands $D_\ell(p_\ell)$ for low quality food are respectively given by:

$$D(p_\ell) = \begin{cases} 0, & \text{if } P_\ell > \ell K \\ \left[K - \frac{P_\ell}{\ell}\right], & \text{if } P_\ell \leq \ell K \end{cases}$$

Since we have in hand $D(p_\ell)$, we can verify the inverse demand function, the inverse demand correspondence $P{:}(Q_\ell) \in R^2_+$ therefore is given by

$$P_\ell(Q_\ell) = \ell(K - Q_\ell) \text{ if } Q_\ell \geqq 0 \tag{2}$$

If we have in hand: (i) the production function of the farmers; (ii) the price P_{fm} paid to the farmers by middlemen; (iii) and the inverse demand function; we can now move to study middlemen behavior.

3. BENCHMARK CASE

Let us firstly do with the case of perfect competition. The result of this case will give us opportunities to analyze the case of market imperfect competition in the food system. Perfect competition is the case in that no participants in market are large enough to have market power to set the price of homogenous products. Perfect competition serves as a benchmark against which measure real - life and imperfectly competitive markets. Under this competition, the farmers and the middlemen maximize the profit and the equilibrium prices clear the market. The definition of this case at equilibrium is given by:

Definition: At equilibrium, $(\lambda^*_j)^N_{j=1}, (q^*_i)^m_{i=1}, p^*_{fm}, p^*_\ell$, are defined as follow:

Middle man maximize profit: $\forall i, q^*_i \in \max_{qi}(P_\ell - P_{fm} - C_m) \,.\, q_i$

Farmer maximize supply quality: $\forall j, \lambda^* \in \text{argmax}_\lambda \, p_{fm} f(\lambda_j) - \lambda_j$

$$\sum_{i=1}^{m} q^*_j = f(\lambda^*_j) = D(p)$$

In the maximization problem of each middle man, we use the method of Lagrange multiplier subject to constrain, the Karush-Kuhn-Tucker conditions is used for equality constrains. The condition for maximization of each middle man therefore given as follow:

$$\begin{cases} P_\ell - P_{fm} - C_m + \beta = 0 \\ \beta \,.\, q = 0, q > 0 \end{cases} \tag{3}$$

We now move to analyze the supply and the demand of foods at the low quality market in the case of perfect competition. To satisfy the first order condition in (3), we obviously have two cases:

When, $\beta > 0$ then $q = 0$; and $\beta = -P_\ell + P_{fm} + C_m > 0$. This implies that when price at low quality market P_ℓ smaller than the cost of middle man plus the price paid to the farmers, there is no trade quantity in the market.

When $\beta = 0$ then $q > 0$ and $P_\ell = P_{fm} + C_m$. This means that since the price at final market equal to what middle man has to pay, the trade quantity is positive and he will sell whatever he wants. We can therefore summary the situation of these two cases as follow:

$$S(P_\ell, P_{fm}) = \begin{cases} 0, & \text{if } P_\ell \leq P_{fm} + C_m \\ [0, +\infty], & \text{if } P_\ell = P_{fm} + C_m \\ +\infty, & \text{if } P_\ell \geqq P_{fm} + C_m \end{cases}$$

We are now clear all the market to find the price and the quantity of the food distribution system. When $\lambda = 0$ and the trade quantity are positive, at equilibrium, the price in the downstream of the food system given by:

$$P_\ell = P_{fm} + c_m \tag{4}$$

We replace P_ℓ in (4) to (2), the trade quantity is given:

$$Q_\ell = K - \left(\frac{P_{fm} + c_m}{\ell} \right)$$

Let us continue using quantity in the upstream to clear the markets, if we have in mind that the aggregate quantity supply at equilibrium of the farmers Q_m given by (1). We also consider that the quantity sell the downstream equal to which supply by the farmers in the upstream, in other word, by definition, we have: $Q_\ell = Q_m$. Therefore:

$$K - \left(\frac{P_{fm} + c_m}{\ell} \right) = N \left(\frac{P_{fm}}{2} \right) \tag{5}$$

The price which farmers receive from middlemen is given as:

$$P_{fm} = \frac{2(\ell K - c_m)}{\ell N + 2}$$

Since we have in hand the price paid to the farmers P_{fm}, we replace $P_{fm} = \frac{2(\ell K - c_m)}{\ell N + 2}$ to (4) to compute P_ℓ, the price at market low quality in perfect competition is given by:

$$P_\ell = \left(\frac{2\ell K + \ell N c_m}{\ell N + 2} \right) = \frac{\ell(2K + N c_m)}{\ell N + 2}$$

Following by definition of the market behavior at equilibrium, and since we have in hand P_{fm}, we can now move to verify the aggregate quantity in the downstream market. This quantity is computed by replacing $P_{fm} = \frac{2(\ell K - c_m)}{\ell N + 2}$ to Q_ℓ at (5) We therefore obtain that:

$$Q_\ell = \frac{\ell K - c_m}{\ell + \frac{2}{N}}$$

Since we consider the assumption that the willingness to pay higher than the cost: $\ell K > c_m$, we observe that $Q_\ell = \dfrac{\ell K - c_m}{\ell + \dfrac{2}{N}}$ is positive.

We can now move to compute the profit of the farmers when they sell their foods for middlemen. Let us recall the production of the farmer: $q = f(\lambda) = \sqrt{\lambda}$, given by the definition at equilibrium, a farmer maximize their labor used, he solves $\max_\lambda P_{fm} f(\lambda) - \lambda$. If we consider that total number of farmers serve for middlemen are N, we know that they operate competitively, and choose the amount of labor that they dedicate to their activity. Under our assumptions their indirect profit is given by $\pi_f^m(p) = \dfrac{1}{4}(P_{fm})^2$. If we now have in mind that the inverse supply of vegetable is given by $P_{fm} = 2\dfrac{Q_\ell}{N}$ (and $Q_m = Q_\ell$ by definition at equilibrium). We can say that the wealth of this farmer are given by:

$$\pi_f^m(N) = \left(\frac{(\ell K - c_m)}{\ell N + 2}\right)^2$$

Since $\ell K > c_m$, we can go to conclude that in perfect competition, at equilibrium, the wealth of farmers is positive. The farmers not only receive the price from middlemen but also take all the cost from them.

On the other hand, at equilibrium, the price at final market equal to price the middlemen paid for farmers plus the cost:

$$P_\ell = P_{fm} + c_m$$

This means that the profit which middlemen remaining is equal to zero.

Proposition 1: Given by all computation, we obtain the result of the case perfect competition:

Case	P_{fm}	P_ℓ	Q_ℓ	π_f^m	π_m
Perfect Competition	$\dfrac{2(\ell K - c_m)}{\ell N + 2}$	$\dfrac{\ell(2K + Nc_m)}{\ell N + 2}$	$\dfrac{\ell K - c_m}{\ell + \dfrac{2}{N}}$	$\left(\dfrac{Q_\ell(N)}{N}\right)^2 > 0$	Zero

We however should look at this result as benchmark case. In fact under pure competition, the price at which the intermediaries sell the products simply take in to account the food price and operating cost: i.e. $P_\ell = P_{fm} + c_m$. This induces non credible out come, the profit of middlemen are zero which is a direct consequence of perfect competition.

But this case obviously does not make senses in real - life of Viet Nam's food distribution case. In the case of Viet Nam, there are significant obstacles preventing perfect competition from appearing in food distribution markets. Several reports on farmer's production and middlemen's trading described this fact in Viet Nam. Maathuis (2006) and Wiersinga (2004), on their report on small farmers, vegetable production and food market in Viet Nam, show that: (i) farmers are small and lacking of market information, most of farmers do not have a good view on potential market; (ii) numerous quantities of foods are harvested at the same time and need to be distributed quickly because of the poor condition on storage; (iii) fruits and

vegetables are produced in different locations and faced with high transportation cost. These situations obviously highlight that there not exists the food market perfect competition in Viet Nam.

4. UPSTREAM MARKET POWER: THE OLIGOPSONY CASE

Since we point out that the perfect competition case is not make senses in the context in Vietnam. We now move to the case of imperfect competition in that middlemen have an oligopsony power over the farmers. Since we introduce Cournot competition, we assume that the middlemen are able to anticipate the effect of their demand for fruits and vegetables on the price that should paid to the farmers. This anticipated price is given by $P_{fm}\left(\sum_{j=1,\, j\neq i}^{m} q_j^* + q_i, N\right) = \frac{2Q_m}{N}$. The definition of equilibrium is therefor given by:

Definition 2: At equilibrium of imperfect competition in the upstream case:

(i) Middle man maximize profit: $\forall i,\ q_i^* \in \max_{q_i}\left(P_\ell - P_{fm}\left(\sum_{j=1,\, j\neq i}^{m} q_j^* + q_i, N\right) - c_m\right).q_i$

(ii) $P_{fm}\left(\sum_{j=1,\, j\neq i}^{m} q_j^* + q_i, N\right);\ \sum_{j=1}^{m} q_j^* = D(p)$

4.1. The Trade Quantity, Prices and Profits

Since we defined all the behaviors of middlemen and farmers at equilibrium, we can now move to compute the aggregate supply quantity, and finally look for profit changing of middlemen and farmers. Following of definition (2), the first order maximization condition is given by:

$$\forall i,\ \left(-\frac{2}{N}\right).q_i + \left(P_\ell - \frac{2\sum_{i=1}^{m} q_i}{N} - c_m\right) = 0$$

By summing over i, equation becomes:

$$\forall i,\ \left(-\frac{2}{mN}\right).q_i + \left(P_\ell - \frac{2Q_\ell}{N} - c_m\right) = 0$$

$$\rightarrow \qquad Q_\ell = \frac{P_\ell - c_m}{\frac{2}{mN} + \frac{2}{N}} \qquad (6)$$

By using the final market equilibrium $\sum_{i=1}^{m} q_i = D(p)$, we can compute the final price P_ℓ:

$$Q_\ell = \frac{P_\ell - c_m}{\frac{2}{mN} + \frac{2}{N}} = K - \frac{P_\ell}{\ell}$$

$$\rightarrow \qquad P_\ell = \left(\frac{\ell K - c_m}{\frac{2}{mN} + \frac{2}{N} + \ell}\right)\left(\frac{2}{mN} + \frac{2}{N}\right) + c_m \tag{7}$$

Replace P_ℓ to (6), trade quantity Q_ℓ is given as:

$$Q_\ell = \frac{\ell K - c_m}{\frac{2}{mN} + \frac{2}{N} + \ell}$$

Let us now compute the equilibrium price P_{fm} which paid to the farmer. If we consider that the supply of farmers equal to the trade quantity at final market, in other word we have $S(A = S_m P_{fm}) = Q_\ell$, this quantity is obtained by the market clearing condition.

$$Q_\ell = \frac{\ell K - c_m}{\frac{2}{mN} + \frac{2}{N} + \ell} = \frac{NP_{fm}}{2} = S_m(p_{fm})$$

Which implies that:

$$P_{fm} = \frac{2(\ell K - c_m)}{\frac{2}{m} + 2 + N\ell} \tag{8}$$

If we now replace P_ℓ at (7) and P_{fm} at (8) to the profit function of respectively farmers $\pi_f^m(N)$ and of middlemen π_m, the profit of these both stakeholders given by:

$$\pi_f^m(N) = \left(\frac{2(\ell K - c_m)}{\frac{2}{m} + 2 + N\ell}\right)^2$$

$$\text{While, } \pi_m = (P_\ell - P_{fm} - c_m) \cdot Q_\ell = 2Nm\frac{(\ell K - c_m)^2}{(2m + N\ell m + 2)^2} > 0 \tag{9}$$

Proposition 2: Given by our computation, we obtain the result at market equilibrium in the case of upstream market power:

Case	P_{fm}	P_ℓ	Q_ℓ	π_f^m	π_m
Upstream	$\frac{2(\ell K - c_m)}{\frac{2}{m} + 2 + N\ell}$	$Q_\ell\left(\frac{2}{mN} + \frac{2}{N}\right) + c_m$	$\frac{\ell K - c_m}{\frac{2}{mN} + \frac{2}{N} + \ell}$	$\left(\frac{2(\ell K - c_m)}{\frac{2}{m} + 2 + N\ell}\right)^2$	> 0

To study how this result of oligopsony case linked to the case of Viet Nam, let us firstly describe more specifically the situation in Vietnamese case. First of all, this case typically based on the fact that there are the large number of farmers, who just exploit in small part of land and live at commune level around the city (or pre-urban areas). On the other hand, there are not too much middlemen who transport foods to

the cities to sell at competitive markets. The basic property of this case therefore is appeared in the way that there is a distortion expect to perfect competition in the price paid to farmers. In more detail, when number of farmers is decreased, it is less distortion because middlemen loose market power. In contrast, when number of farmers is increased, there is more distortion because middlemen have more market power. From this point of view, let us now move to analyze the result of this case.

We firstly observe that the price paid by middlemen to the farmers $P_{fm} = \frac{2(\ell K - c_m)}{\frac{2}{m} + 2 + N\ell}$ directly depend on number of farmers, numbers of middlemen, the willingness to buy of consumers and the cost of middlemen. This illustrates the situation in Viet Nam:

(i) Middlemen paid to the farmers at very low prices when number of farmers very larger. This occurs when several same products are produced by numerous of farmers and is harvested at the same time but do not have enough preserved condition to keep it longer. As consequence, most of farmers try to sell it as soon as possible at cheap price.

(ii) In contrast, farmers sell at higher price since number of farmers is decreased; this case appears when farmers produce the products which are not very popular. For instance, some products are growth and harvested in sub-crop and sell at higher prices.

4.2. Distortion in the Price

Let us go further to study the distortion in price paid to farmers expects to perfect competition. If we have in hand that in this case: $P_{fm}^{\text{Upstream case}} = \frac{2(\ell K - c_m)}{\frac{2}{m} + 2 + N\ell}$ and in the case of perfect competition $P_{fm}^{\text{Perfect case}} = \frac{2(\ell K - c_m)}{\ell N + 2}$, and since $\ell N + 2 < \frac{2}{m} + 2 + N\ell$, we obtain that:

$$P_{fm}^{\text{Upstream case}} < P_{fm}^{\text{Perfect case}}$$

This result obviously indicates that since middlemen have market power, they give lower price to the farmers comparing to the case of pure competition.

However, the market power of middlemen in upstream even have an effect on the final price competitive. In other word, even it is competitive at consumers market, the price $P\ell$ at final market is higher compare to it the benchmark case, or in other word:

$$P_{\ell}^{\text{Upstream case}} < P_{\ell}^{\text{Perfect case}}$$

Proof

If we consider that in benchmark case, we obtain:

$$P_{\ell}^{\text{Perfect case}} = P_{fm}^{\text{Perfect case}} + c_m$$

While in the upstream case, we have:

$$P_{\ell}^{\text{Upstream case}} = \left(\frac{\ell K - c_m}{\frac{2}{mN} + \frac{2}{N} + \ell}\right)\left(\frac{2}{mN} + \frac{2}{N}\right) + c_m = P_{fm}^{\text{Upstream case}}\left(\frac{1}{m} + 1\right) + c_m$$

$$= P_{fm}^{\text{Perfect case}} \underbrace{\left(\frac{(\ell N + 2)}{N\ell + 2 + \frac{2}{N}}\right)\left(\frac{1}{m} + 1\right)}_{>1} + c_m$$

Since we observe that:

$$\left(\frac{(\ell N + 2)}{N\ell + 2 + \frac{2}{N}}\right)\left(\frac{1}{m} + 1\right) = \frac{m(\ell N + 2) + (\ell N + 2)}{m(\ell N + 2) + 2}$$

We can therefore conclude that:

$$P_{\ell}^{\text{Upstream case}} > P_{fm}^{\text{Perfect case}}$$

Proposition 3: In the oligopsony case, even the price paid to the farmers is lower (i.e. $P_{fm}^{\text{Upstream case}} < P_{fm}^{\text{Perfect case}}$), middlemen sell foods at higher price to the consumer comparing to perfect case: (i.e. $P_{\ell}^{\text{Upstream case}} > P_{fm}^{\text{Perfect case}}$).

4.3 The Difference in Profits

We finally compare the profit in this case with those in competitive benchmark:

Concerning the farmer, it is important to remember that there indirect profit given by $\pi_f^m(p) = \frac{1}{4}(P_{fm})^2$ and since the inverse supply of fruit and vegetable is given by $P_{fm} = \left(\frac{2Q_m}{N}\right)$, this profit become:

$$\pi_f^m(p) = \left(\frac{Q_{\ell}(N)}{N}\right)^2$$

Therefore, to compare the profit, we compare the equilibrium quantity. If we consider that Q_{ℓ} in upstream case: $Q_{\ell} = \frac{\ell K - c_m}{\frac{2}{mN} + \frac{2}{N} + \ell}$ and in perfect case $Q_{\ell} = \frac{\ell K - c_m}{\ell + \frac{2}{N}}$, we can now compare the equilibrium quantity. It is easily to observe that: $\ell + \frac{2}{N} < \frac{2}{mN} + \frac{2}{N} + \ell$, which implies that:

$$Q_{\ell}^{\text{Upstream case}} = \frac{\ell K - c_m}{\frac{2}{mN} + \frac{2}{N} + \ell} < Q_{\ell}^{\text{Perfect case}} = \frac{\ell K - c_m}{\ell + \frac{2}{N}}$$

This result obviously indicates that the farmers' profit in this case is smaller than the benchmark case:

$$\pi_f^{m\ \text{Upstream case}} < \pi_f^{m\ \text{Perfect case}}$$

Moreover, it is quite clear to observe that because of market power, there is the distortion expect to perfect competition in the price paid to farmers and the price at final consumer markets. This is the reason why the profit of the middlemen in this case is positive (see (9)) comparing to zero in the case of pure competition.

To summarize

Proposition 4: We observe that, as consequence of the distortion in the price expect to pure competition, less quantity are traded in the upstream case: (i.e. $Q_\ell^{\text{Upstream}} < Q_\ell^{\text{Perfect}}$).

Proposition 5: We can also show that, the profit of farmers is decreased since middlemen capture a part of their return: ($\pi_f^{m\ \text{Upstream case}} < \pi_f^{m\ \text{Perfect case}}$)

5. POLICY IMPLICATION

Since we construct the theoretical model of middlemen behavior base on an imperfect competition approach, let us now move to discuss the policy implication directly toward increasing the wealth of farmers and reducing market power of the middlemen based on the intervention on market imperfect competition. In more precisely:

5.1. Land Reform

According to General Statistic Office of Viet Nam (GSO), by the year 2011, there are still 69% of households using agricultural production land with scale under 0,5 ha, and 34,7 % households with land scare under 0,2 ha (see GSO, 2012). Such small lands can be seen to have an impact on the benefit of small food producers and consumers as well. Based on this consideration, it is obviously that, if small lands can be used more effectively and frequently, it may not only improve their productivity but also, moreover, can control food market imperfect competition.

If we have in mind that the profit of the farmers depending on the supply quantity of the food, we observe that it is important to conduct land reform policy. This instrument is expected to improve productivity and create quantity shock in supply market of the farmers. Of course, land reform policy can reduce market power of farmers but fortunately they gain benefit by supplying more foods in the market.

5.2. Implemented Cooperative

Since most of the food producers are small farmers, the appearance of cooperatives is a solution to support small farmers accessing product markets. In fact, cooperative will improve market power of farmers. This organization support farmers deliver their product by several activities. For instance, cooperative add value for products including package and brand name for the products, food preservation and negotiate contract with modern channel.

Moreover, when farmers serve for cooperatives, they not only receive incentive quantity price paid from cooperative but also obtain profit sharing from this organization. This is the reason why farmers have opportunities to increase their wealth when supply foods through cooperatives.

5.3. Improve Infrastructure to Reduce Transaction Cost

It can be seen that the higher of transaction cost lead to the higher market power of middlemen. That is the reason why we introduce the solution of improve infrastructure. This instrument in fact reduce market power of middlemen. Based on the competitive model of middlemen behavior, we observe that since the infrastructure in good condition, it will reduce the cost of the middlemen and therefore farmers have opportunities receive higher price paid from middlemen.

6. CONCLUSION

We present the model of middlemen behavior in the traditional food distribution system. Base on an imperfect competition approach, the paper focus on economics analysis the behavior of middlemen at market equilibrium. We show that, since middlemen act as intermediaries between farmers and consumers, their market power directly affects the wealth of both food producers in the upstream and consumers in the downstream of the food system. We indicate that, since middlemen have market power in the upstream, there is always a distortion with respect to perfect competition in the price paid to farmers and sold to the consumers. In fact, the price paid to the farmers is lower, while the price paid by consumers at final demand market keeps higher comparing to perfect competition. As a consequence, the wealth of farmers becomes lower even consumers buying foods at higher price. This is the reason why we can go to conclude that with their market power, middlemen capture some profit from the farmers and also take a part the wealth of the consumers in traditional food distribution system. These results makes follow intuition particularly in the context of Viet Nam where the price of fruits and vegetables is fluctuated and the intermediaries always exercise a pressure on the price paid to the farmers while they sell at very high prices at consumer market (see Maathuis, 2006; Wiersinga 2004;and Moustier 2007).

Based on the result of middlemen behavior model, we analyze policy implication directly toward improving the wealth of food producers and reducing market power of the middlemen. The main policy focus on land reform to create productivity shock, develop cooperative to support farmers accessing product market, and improve infrastructure to reduce market power of middlemen.

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