Market Power in the Agricultural Products Marketing (Case of: Poultry Meat, Egg and Milk)

Reza Moghaddasi[1] and Negar Shamsi[2]

[1] Associate Professor, Agricultural Economics Department, Science and Research Branch, Islamic Azad University, Tehran, Iran
[2] M.Sc Student, Agricultural Economics Department, Science and Research Branch, Islamic Azad University, Tehran, Iran
r.moghaddasi@srbiau.ac.ir

Abstract: Recognizing the price behavior in agricultural products' market is one of the key issues in marketing because the market structure (competitive and noncompetitive) which affects the production volume and prices of agricultural products and thus the interests of different groups in society. The purpose of this research is to study market power in the marketing process of agricultural products (case study of poultry meat, eggs and milk). In this study, monthly data for the years 2002 - 2006 were used for these three products. Existence of market power using the economic model of Jyrky and Liu and based on reviewing variables indicating transportation costs, price index of the given product producer and consumer, the variables of demand and supply modifying variables (the price index of producer and consumer for all goods) have been tested on the retail price index. The research results indicate the positive and significant effect of modifier indicator variables related to the demand and supply of poultry products, the change of the demand and supply variables and the Producer Price Index for egg production and supply modifier indicator variable for milk product. While conditions of perfect competition in the markets have been rejected for these products, this means that considering Lloyd standards, these three products in Iran benefit from the profits of market power.

1. Introduction

Measuring and evaluating competitiveness, exclusive power and monopoly in the market and determining market structure are the main issues of marketing process. Features like input and output freedom degree, information harmony, goods' homogeneity degree and economic profitability of institutes are considered as markets' separation factors. In economic literature, the ability of an institute in determining product price in a higher level than the competitive price level of price determination set at a lower level than its competitive price level is known as market power or monopoly feature. Market power affects price determination and hence marketing margin. Different economic subsectors have markets whose price determination nature in each of them (considering their structure) is different. Market active forces need acquiring sufficient information about price structure and behavior in different levels of marketing to maximize their benefits.

In Iran, considering urban development of recent decades and transition from traditional agriculture to a new level and also increase of supplied agricultural products' share in market from all produced goods, price and agricultural products marketing issues have received increasing importance. Prices are the main determinants of farmers' income level, exchangers and exporters of agricultural goods and economic improvement level of the consumers (Hosseini, 2006). In reviewing price relations in different levels of food market from producers to consumers a common method for evaluating market efficiency and competitiveness degree has been food processing and marketing. (von Cramon-Taubadel. 2003)

Edible and drinkable goods in Iran involve the main part of consuming goods. According to I.R. central bank 23.7 percent of family expenses are allocated to edible and drinkable goods which after housing, electricity, water and fuel have the highest share compared with all expense groups.

In the past 20 years, more than 25% of all household expenses were allocated to foodstuffs. From these, we can conclude that foodstuffs are considered as the main goods in Iranian household basket and include a high share of family expenses.

About pricing, it should be mentioned that most agricultural products in production stage are directly supervised by the government, but in other market levels, supervision is made by wholesalers and retailers (Tomek and Robinson, 2009). In the case of protein products, because of marketing service expansion, wholesalers and retailers have a major role in determining their price. In the past ten years, the

price of different protein products has always been incremental and sometimes special factors have caused more rapid increase or controlled price increase.

If we examine the price change trend in poultry meat, egg and milk in different months during 1997-2008, it may be seen that chicken and egg prices have always showed increase with some fluctuations. But price increase trend in milk during these years has been increasing with little fluctuation. In spite of adopting many strategies, not only the general trend of prices haven't been controlled or decreased, but also have increased. Effects of this price increase are decrease in household purchase power and hence decrease in consuming agricultural products. The necessity of foodstuff in household consume basket and decrease in their real income because of increase in products price, requires special attention to the products of this market and examining their pricing trend and finally market power.

2. Material and Methods

In this research we used first filter test discussed by Jyrki and liu (2010) and also generalizing balance shift model applied by Gardner (19875), Hallowy (1991), mc Christen (2001) and Lloyd et al (2009). In fact, institutions behavior stabilizing model, used for products market, is employed. Also in order to find long-term relation between the variables we use Johansen co-integration test which is examined by trace statistic and max specified root. The point here is that in agriculture section there always is an interval between deciding to product and supplying product in market. This makes the volume of product entering the market pre-determined and price plays the modifying role to establish balance in market till discharging market from these goods. In this situation, reverse demand function in which price is expressed as a function of values would be appropriate to predict the reaction and response of goods price in relation to the amount entering the market.

Considering demand function in retailer level and supply function in the farm level, agency profit in retailer level would be optimal. Product transport cost obtained to maximize profit (F.O.C) is explained.

If we assume that product production technology is a constant ratio of this input, we may write it as a coefficient of this input; meaning that production in retail level would be the coefficient of input-output.

If demand function in retail level and supply function in farm level is linear, we may conclude direct demand in farm level and reverse supply in farm level in which production volume in retail level, price in retail level, factors transferring reverse demand, input price and factors transferring input supply are employed. We may show demand rate in

farm level as sum total of demand in retail level and factors of supply transfer.

According to Sexton and Levy (2001) competition rate is measured by the response of agencies production to one agency production in which price and agency product amount in retail level, input price, coefficient or collective expectation elasticity and a collection of other variables influence marketing margin (other expenses). So, according to the coefficient or collective expectation elasticity, we may understand the agencies behavior in the market. If $\theta = 1$, market behavior is close to monopoly or price fixing, meaning that there is a complete market-power or that an agency has dominated market and prices. If $\theta = 0$, market behavior is close to complete competition, meaning that no agency has dominated market and prices. So, if there is purchase power in market ($\theta = 0$), we may express the equation in this way:

$$R = P + M \tag{1}$$

M is marketing margin from farm to retail sale which is a linear function of marketing expenses (transport). If we show these expenses with E, we will have:

$$M = X + \gamma E \tag{2}$$

So, equation (1-1) may be written as the following:

$$R - P = X + \gamma E \tag{3}$$

As is observed marketing margin in market is a complete function of marketing expenses. Therefore, factors transferring retail demand (D) and supply at farm level don't affect marketing margin. If $\theta \neq 0$ meaning that market is non-competitive (market power exists), the above equation is written as:

$$R - P$$
$$= \frac{\theta \left(\frac{1}{a+k}\right)(h - bD) + (1 + ak)(X + \lambda E - \theta kS)}{(1 + \theta)(1 + ak)} \tag{4}$$

In which marketing margin (R-P) is a function of marketing expenses (E), factors transferring demand function in retail level (D) and factors transferring supply function on the farm (S). Considering the above mentioned facts, the estimated model is expressed in this way:

$$R = \beta_0 + \beta_1 P + \beta_2 M + \beta_3 D + \beta_4 S \tag{5}$$

In which R is the price in retail level, P input price (A), M a collection of variables influencing marketing margin, D factors transferring demand function at retail level and S factors transferring supply function on the farm. Regarding the above equation, it seems that coefficients would be $\beta_1 > 0$ and $\beta_2 > 0$. It means that by adding price at farm level and marketing margin, price will increase in retail level. In input price increases, we expect that price will increase in different levels of market like

retail level. Because transferring variables determine the existence or lack of existence of market power.

In order to estimate marketing margin model, we may use time series model (VAR (p). If time series model is

$$Y_t = \Psi_1 Y_{t-1} + \cdots + \Psi_m Y_{t-m} + \Omega Z_t \qquad (6)$$

In which Y_t is variable vector and Z_t is the vector of variables determining Y_t. If a variable is first degree or I(1), VAR(p) is translated to vector error correction model (VECM) in the following way

$$\Delta Y_t = \alpha\beta' Y_{t-m} + \Sigma\eta_i \Delta Y_{t-1} + \Omega D_t \qquad (7)$$

In fact, equation 7 is estimated as a vector self-explanation model. Of course in order to estimate this model, testing long term relations of retail and farm level price will determine long term relations' number. If there is a long term relation between retail and farm level, we may test significance of

transferring demand in retail level and supply in farm level to determine market power.

If market is competitive (there is no market power), retail and farm price may be convergent with marketing expenses. If retailers have market power, factors transferring demand in retail level and supply in farm level enter price equation. So as it was mentioned, competitive market power hypothesis is obtained by corrective proportion test of limiting demand transfer in retail level and supply in farm level through convergence equation.

By estimating equation no.5 as vector error correction model, besides this test number of long term relations and estimation of price long term equation in retail and farm level, factors influencing marketing margin, market power and causes of market power are estimated and measured.

3. Results and Discussion

In the following table, statistical review of variables under study is addressed.

Table 1: Statistical review of variables under discussion

Products	Min. price index	Max. price index	Average	Standard Deviation	Variance coefficient
Poultry meat	199	330.30	261.80		35.16
Egg	173	410.20	264.30	54.35	0.20
Milk	181.60	355	256.40	49.50	0.19

Source: Research findings

As is observed, examining this table shows minimum and maximum price indices of three products so we may obtain factors like standard deviation, average and variance coefficient. As is obvious from these numbers, the most difference between price index min. and max is for egg, milk and poultry meat, respectively. Results show that by time

passing, the assumed products prices have shown increment increase.

Now we review variables stability, by one time differentiating according to the most useful tests in stability fields like Dickey Fuller, Philips Prone and KPSS.

Table 2. Review of variables stationarity tests

Variable	ADF statistic	PP statistic	KPSS statistic	Test result	Integration order
Chicken consumer price index	-6.43*	-7.74	0.30	stationary	I(1)
Egg consumer price index	-6.72*	-6.42	0.08	stationary	I(1)
Milk consumer price index	-6.57*	-6.70	0.14	stationary	I(1)
Transport expense	-6.62*	-14.16	0.07	stationary	I(1)
All products consumer price index	-5.18*	-28.74	0.30	stationary	I(1)
All products producer price index	-5.18*	-11.69	0.08	stationary	I(1)
Chicken producer price index	-8.31*	-7.20	0.08	stationary	I(1)
Egg producer price index	-7.20*	-9.76	0.04	stationary	I(1)
Milk producer price index	-8.67*	-8.68	0.10	stationary	I(1)

Source: research finding * significance at 1% level

Review of co-integration test according to Vector error correction model (VECM)

Next step is reviewing co-integration studies between under study variables. In VECM model, variables should have 2 main conditions: 1. All

variables should be integrated of first order. 2. Variables should be co-integrated. It means that probability of the significance of at least one variable should be less than 1. By this explanation, we may understand long term relations of variables. For

variables co-integration test, we use Johansen test including two statistics: trace and max-eigen root. Now, we may estimate co-integration model for three under study products. Using these obtained results, it was shown that variables have both preconditions of stability and co-integration. So we may find their long term relation.

Study of co-integration model estimation on retail price indices of mentioned products

In this section, co-integration estimation on retail price index for each product is studied separately and significance and non-significance of variables and their influence on the degree of this index and its market power is identified, too.

Table 3: Estimating Co-integration model of meat products

Indices	Parameters	Estimated coefficient	t- statistics
Producer price index (P)	β_1	0.50 (0.49)	1.02
Transport expense (M)	β_2	0.47(1.47)	0.25
Total consumer price index (D)	β_3	-3.89 (0.49)	-7.93***
Total producer price index (S)	β_4	4.61 (1.29)	3.57***

Source: research finding *** significance at 1% level

Table 4: Estimating co-integration model of egg product

Indices	Parameters	Estimated coefficient	t- statistics
Producer price index (P)	β_1	3.83 (1.43)	2.67***
Transport expense (M)	β_2	0.30 (3.96)	0.075
Total consumer price index (D)	β_3	-9.76 (1.43)	-6.82***
Total producer price index (S)	β_4	12.04 (2.55)	4.72***

Source: research finding *** significance at 1% level

Table 5: estimating co-integration model of milk product

Indices	Parameters	Estimated coefficient	t- statistics
Producer price index (P)	β_1	0.14 (0.19)	0.73
Transport expense (M)	β_2	0.21 (0.50)	-0.42
Total consumer price index (D)	β_3	0.75 (0.10)	-7.5***
Total producer price index (S)	β_4	1.18 (0.30)	3.93***

From results and table interpretation for all three products we may mention the consistency of difference between producer and retail price and competition performance and finally that by one unit increase or reduction in total producer price index and as a result one unit increase or reduction in retail price according to their minus or plus signs, we may understand market power for all three products.

Corresponding Author:
Dr. Reza, Moghaddasi
Associate Professor, Agricultural Economics Department, Science and Research Branch, Islamic Azad University, Tehran, Iran
E-mail: r.moghaddasi@srbiau.ac.ir

4. Conclusion and suggestions

As it was mentioned earlier, in this article we use Lloyd experiment procedure to examine market power existence in Iran foodstuff article. As Lloyd explains, this approach has been simple and clear; hence it presents statistical tests resulting from theoretical foundations. Besides, experiments don't require much data and so are performed using standard methods of time series analysis. Concluding from price index data in producer and retailer level, we showed that complete competitive hypothesis should be rejected; it means that considering Lloyd standards, in Iran poultry meat, egg and milk have benefited from market power traits. If variables like total producer price index and total consumer price index are significant, it shows that power market exists and market is far from competition. In order to analyze

tables of three under study products separately, we may begin from poultry meat. According to tests carried on this product, results show that total consumer price index variable is significant at level of 1% and minus sign shows that by adding one unit in this index, retail price as a dependant variable will decrease 3.89 unit. Also, total producer price index variable is significant at level of 1% and its positive sign shows that by adding one unit in this index, retail price as a dependant variable will decrease 4.61 unit. Producer and transport expense index variables aren't significant, too. So according to results it will be obvious that transport exchange has the least influence and total producer price index has the most influence on poultry meat retail price. The table pertaining to egg product shows that total consumer price index is significant at the level of one percent and its minus sign shows that adding one unit in variable amount, reduces retail price as a dependent variable by 9.76 unit and its plus sign shows that by adding one unit in the amount of this index, its retail price will increase 12.04 unit. Producer price index is also significant at the level of 1% and minus sign shows that one unit increase in the amount of this index will reduce its retail price, as a dependant variable, about 3.83 units. So, according to these results, it would be obvious that transport exchange variable has the least influence and total producer price index variable has the most influence on egg product retail price. Table of milk product shows that total producer price index variable is significant at the level of 1% and its plus sign shows that adding one unit to this index will increase retail price about 1.18 unit. So according to the results it would be obvious that transport exchange variable has the least influence and total producer price index variable has the most influence on milk product retail price. Total results according to test and reviews show that there is market power for these products in Iran foodstuff market and market is not in complete competition. So, according to the results obtained, it is suggested to give more importance to the variables having negative obtained number so that increase will occur and variable numbers which are positive should reduce so that retail price will reach to balance level. Another suggestion is paying attention to price fluctuation issues for products under study. As it was mentioned earlier, in specific times of the year, especially recent months of years of this research, extreme fluctuations have occured in products price; the factors creating these fluctuations should be examined so that price fluctuations in the market is prevented and at the same time market situation will be stable.

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