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Assessment of Beef Market Price Transmission in Tehran province

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ABSTRACT

Price of agricultural products is one of the most important tools of resource allocation in national economics and also it has an identifying role in the agricultural economics of the countries. Another important issue which affects directly on the prices and market is the method of price transmission of beef market. The method of price transmission of beef market reveals the activity manner of effective agents in the market. In this study which is a case study, price transmission of beef market in Tehran price has been examined through Error Correction Model during the price of 1380 – 88. The results show that the price transmission of beef market in Tehran is symmetrical in long term. On the other hand price transmission of beef from farm to slaughterhouses or from farm to retail stores is asymmetrical, but it is symmetrical from slaughterhouses to retail stores. Over all the increases of price of cows in the farms increase the price of beef in the slaughterhouses and also the decreases of price of cows in the farms decrease the price of beef in the slaughterhouses. In fact, the marketing agents of beef (slaughterhouses, dealers, producer's transportation and storage) benefit from transmission of beef from one part of the market to the other get parts. Increasing of investing in production and slaughterhouses, organizing informational agencies and calculating the cost price of each kilogram and observing the price of selling and buying cows by marketing agents are some suggested ways of this research.

Keywords: beef, Error correction model, Iran, price transmission, Tehran province

JEL classification: Q11, Q13, C32

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INTRODUCTION

The prices are identifying factors of agricultural incomes and export agents of agricultural products and economical welfare level of consumers (Hoseini, 2006). The reflexive prices show the productivity of the resources and the price transmission connect the markets to each other horizontally or vertically (Meyer & Von Cramon Taubadel, 2004). Knowing the conditions of the price transmission in the supply chain marks is important, because it affects on the social surplus distribution which is as a result of commercial policies (Goodwin, 2005). Also it provides information about the received prices of producers and payed prices of consumers, productivity of markets and producers and consumers welfares (Capps & Sherwell, 2005). Some researchers believe that the asymmetrical price transmission shows the market failure and misuse of market (Meyer & Von Cramon –Taubadel, 2004). So analyzing the agricultural products price is of high importance.

In the recent experiments, the investigation of price relations to vertical unity of different levels of food markets from producers to consumers is very common method of productivity of market and the degrees of competitiveness of supplying and marketing of food products (Frey & Manera, 2005). The presence of symmetrical prices in the market shows the complete transmission of increase or decrease of price on the farmlands to retail stores or agents and if the transmission occurs asymmetrically, these differences of price will be for the benefit of brokers and loss of producers and consumers and will have some more expenditures on the consumers. The presence of asymmetrical price transmission will have some side effects and will be beneficial for the marketing agents (agricultural producers, retail agents, wholesalers agents and brokers (Hoseini & Nikokar, 1385)) so the conditions of price transmission is of high importance for the most market polices because of its side effects and productivity of markets. One of the important aspects of asymmetrical price transmission hypotheses is the presence of different kinds of asymmetrical price transmission. There are two major transmissions. One is the absence of symmetric in the big reaction and another is the absence of symmetric in the speed of reaction. The asymmetric in the big reaction occurs when the amount of price changes in one market will be different from the price increases and decreases in the other markets. If the decreases and increases in one market transforms in different time periods to another market, the asymmetric will happen in the speed of reaction (Meyer & Von Cramon-Taubadel, 2004). In another classification, if the price of retail reacts rapidly to the increases of price on the farmland than the decreases of prices on the farmland, there will be a positive asymmetric and if the price of retail reacts

rapids to the decreases of prices on the farmland, than the increases of price on the farmland, there will be a negative asymmetric (Peltzman, 2000). From the view of Hansen et al (1994), there are two long term and short term asymmetrical transmission. The short term asymmetrical transmission will happen when the amount of rapid effect of decrease and increase of price of producers on the price of retail is not the same, but in the long term one it is the same. The long term asymmetric of price transmission will happen when the price increase in the short term has different effects than the price decrease in the long term.

There are lots of experimental studies rather than theoretical studies among the reviews of studies about the reasons of asymmetrical price transmission. Aguiar & Connor (1997) believed that the important factors in powerful price transmission are the power of marketing agents. Aguiar & Santana (2002) believed that the absence of symmetrical price transmission depends on factors such decay and storage of products the market focus on special products and the presence of power of marketing agents, the more the above mentioned factors the more the higher the price transmission, consumers organization, and the price expectation and the interventional government policies. Another reason which has been mentioned in the literature review of other research is the storing management. Reagan & Weitzman (1982) believed that when the people do not want something or want it less, the markets decrease the supply and increases the products in the stores and as result the product price does not decrease. But when people demand a product a lot, the market increases the price. Another important reason which has been mentioned in the other research is the presence of cost reduction. Goodwin (2003) believed that institution reaction depends on the amount of price changes. When the exchange expenditure becomes high even in the competitive environment, the institutions fail to decrease the price just a little.

The price transmission has experimental support the most, and there are lots of studies about it. Benson and Faminow (1985) in their studies about food price in chain stores concluded that the presence of place deficiency markets for some products and for some stores leads to incomplete price transmission and uncompetitive prices. Bettendorf and Verboven (2000), understood that in spite of presence of coffee competitive market in Netherlands, the price transmission of this product was incomplete. Abduolai (2002) believes that the rapid increased price transmission of beef in Switzerland was because of power of marketing agents in the markets. Aguiar and Santana (2002) showed that the price transmission in Brazilian competitive markets of agricultural products was symmetrical. Serra & Goodwin (2003) investigated the price transmission of dairy products in Spain and

concluded that because of power of milk companies, there is an incomplete price transmission from the farmland to retail stores. Girapunthong et al (2003) analyzed the price relations in producers, wholesale agents and then retail agents in the tomatoes markets in the U.S. and concluded that the prices transmit from producers to wholesale agents and then to retail agents, the wholesale prices react more to decrease on the farmland than to increase and retail reacts Vis versa. London Economics in Department for Environment, Food and Rural Affairs (DEFRA) (2004) in a comprehensive study analyzed the effective factors on price difference on the farmland and retail of more than 90 products in England and concluded that asymmetrical price transmission is not common phenomena expect on dairy products. Capps and Sherwell (2005) analyzed the symmetrical test for 7 states of America from farmlands to retail agents of dairy products and the results showed the asymmetrical price transmission. About Iranian researches, Gahramanzadeh and Falsafian (2005) investigated during 1991-2001 on the price transmission beef in Iran and concluded that the increased price of producer which leads to few side effects transmits rapidly to retail agents rather than decreased price in producer which leads to the increase of side effects. Hoseini et al (2008) examined the chicken market of Iran, in which the asymmetrical market structure was because of the incomplete price transmission from slaughter houses to marketing. Nikokar et al (2010) investigated the beef market of Iran which reported a asymmetrical price transmission from farm to retail agents or from farm to slaughterhouses.

One of the products which is of high importance to Iranian politicians, producers and consumers is beef. On the other hand the importance of husbandry is important because of country's economical growth, providing the needed protein of consumers. Paying more and enough attention to beef price is essential because its presence in the diet of Iranian families is very important and because of its increased price the actual income of each family decreased (Noorollah zadeh, 1999). This project aims to investigate the vertical price transmission of beef in Tehran province.

Table 1. Comparison of agricultural production of Tehran province with all of the country (thousand tons)

Topic	Tehran province	All of the country	Percentage of country
Agricultural products	3400	71260	4.77
Garden products	1072	14009	7.65

Animal and bird products	1238	11340	11.28
Fishery products	1.3	460	0.28
Total	5711.3	97069	5.88

Source: Agricultural Jihad of Tehran province

Table 2. Rate and order of index products of animal and bird section of Tehran province in country

Section	Row	Name	Unit	Amount	Order in Iran
Animal	1	Meat	Thousand tons	85	First
	2	Raw milk	Thousand tons	855	First
Bird	3	One day chicken	Million pieces	216	First
	4	Egg	Thousand tons	216	First

Source: Agricultural Jihad of Tehran province

Tehran province has a population over than 1332 8011 which includes 19.02 percent of whole population of Iran (Agricultural organization of Tehran province, 2008 and 2009). In comparison with other products, this product (beef) is the highest producer of agricultural products which involves 11 percent of whole country. So as the table 2 shows, Tehran has the first rank in the county. Over all the 20 percent population from the whole population of the country shows the bigness of the market and importance of its investigation.

MATERIALS AND METHODS

Several methods have been indicated to test the asymmetrical price transmission. Meyer & Von Cramon-Taubadel (2002) in a comprehensive investigation explained all types of tests to identify the asymmetrical price transmission. He classified all types of tests into 3 groups of Houck test, Error Correction Model test and Threshold test. The problem of Houck test is that all patterns based on the vector auto regressive (VAR) are apart from each other. This method is not considered as perfect one, because it ignores the time. For the first time Von Cramon-Taubadel and Fahlbusch (1996) used accumulated methods for testing asymmetrical price transmission. When the lists of prices accumulate on each other, the Error Correction Model will be used instead of Houck methods which are more acceptable. Engle & Granger (1987) declared that the condition of using the Error Correction Model is cumulating at the same degrees. The other factor which makes the Error Correction Model superior to Houck is the

long term relations between the price lists. This research makes use of Error Correction Model to test the price transmission at different levels of Tehran beef market.

1- The pattern of price transmission from farm to retail:

Before identifying the pattern of price transmission for doing Error Correction, cumulative pattern must be identified among the variables. The pattern of accumulation between the prices of retail stores with the cow price in farm is calculated as the following:

$$RP_t = \lambda_0 + \lambda_1 FP_t + e_{RF,T} \quad [1]$$

In the first (1) pattern RP_t is the price of each kilo of beef, PF_t is the price of each kilo of cow. The variable $e_{RF,T}$ is a part of cumulation. The long term relations among the variables is hidden in $e_{RF,T}$. By using the terms of pattern error (1), the economical estimation pattern of price transmission of beef from farm to retail stores can be indicated as following through Error Correction Model:

$$\begin{aligned} \Delta RP_t = & \alpha_0 + \sum_{j=0}^{L1} \alpha_{1,i} \Delta FP_{t-i}^+ + \sum_{j=0}^{L2} \alpha_{2,i} \Delta FP_{t-i}^- \\ & + \varphi^+ e_{RF,t-1}^+ + \varphi^- e_{RF,t-1}^- + \varepsilon_t \end{aligned} \quad [2]$$

In the second (2) patterns, $\Delta RP_t = RP_t - RP_{t-1}$ shows the price changes of retail of the previous time and is a dependent of increases (ΔRP_{t-i}^+) and decreases (ΔRP_{t-i}^-) in cows in farm and negative and nonnegative pauses are parts of accumulation. In this model $e_{RF,t-1}^+$, $e_{RF,t-1}^-$ variables are lags error terms of cointegration in long run relation of model (equation (1)) which are divided into non negative and negative phases, other variables have been previously defined so estimation of model (2) from its coefficient are used for evaluating the way of prices change transmission by using error correction test.

2-price transmission model from slaughter house to retail

The evaluation of the way of price transmission of beef from slaughter house to retail by using of error correction test is part of the main purpose of this paper. In order to reach this purpose, cointegration model between prices of one Kg beef in slaughter house with retail price of one Kg beef is expressed:

$$RP_t = \theta_0 + \theta_1 SP_t + e_{RS,T} \quad [3]$$

In this model, RP_t is retail price of one Kg beef and SP_t is the price of one Kg beef in slaughter house. The variable $e_{RS,T}$ is the error term of cointegration in long run relation of variables of model which long run relation is hidden in this term. By using of error term of

model (3), econometric model of price transmission of slaughter to retail for error correction test is expressed as following from:

$$\Delta RP_t = \beta_0 + \sum_{i=0}^{M1} \beta_{1,i} \Delta SP_{t-i}^+ + \sum_{i=0}^{M2} \beta_{2,i} \Delta SP_{t-i}^- + \mu^+ e_{RS,t-1}^+ + \mu^- e_{RS,t-1}^- + \nu_t \quad [4]$$

In model (4) (ΔRP_t) is a function of increases (ΔRP^+) and decreases (ΔRP^-) of the price of 1Kg beef in slaughter house and non negative amounts ($e_{RS,t-1}^+$) and negative amounts ($e_{RS,t-1}^-$) are error terms of cointegration. By estimating the model 4 from its coefficient, it can be used for evaluating the way of price transmission between slaughter house and retail.

3-price transmission model from farm to slaughter house

In order to study and consider the way of price transmission of live cow in farm to price of beef in slaughter house by using error correction test, the cointegration model between price series in these two levels of market must be determined. Cointegration model between price series of one Kg live cow in farm with the price of one Kg beef in slaughter house is expressed as follows:

$$SP_t = \tau_0 + \tau_1 FP_t + e_{SF,t} \quad [5]$$

In with FP_t is the price of one Kg live cow in farm, SP_t is the price of one Kg beef in slaughter house the variable $e_{SF,t}$ is the error term of cointegration that long run relation is hidden between the variables of model in this term. By using of error term of model (5) econometric model of price transmission from farm to slaughter house for error correction test is expressed as follows:

$$\Delta SP_t = \delta_0 + \sum_{i=0}^{N1} \delta_{1,i} \Delta FP_{t-i}^+ + \sum_{i=0}^{N2} \delta_{2,i} \Delta RP_{t-i}^- + \psi^+ e_{SF,t-1}^+ + \psi^- e_{SF,t-1}^- + \nu_t \quad [6]$$

In model (6) price change is a function of increases and decreases of the price of 1Kg live cow in farm and lag of non negative and negative amount of error term of cointegration. $\Delta SP_t = SP_t - SP_{t-1}$ shows the price transmission of 1Kg beef in slaughterhouse to previous period. The variables $e_{SF,t-1}^+$, $e_{SF,t-1}^-$ is lags of non negative and negative error terms of cointegration in long run relation of variables of model (equation 5). Other variables have also been defined.

For doing price transmission test by error correction method in Tehran beef market structure, econometric models of (2), (4), (6) are estimated, then variable coefficients of

decrease and increase of price in each estimated econometric models are used for doing error correction test for evaluating the speed, magnitude and being long run of price transmission as the following

4- Evaluation of magnitude test of price transmission

According to estimated coefficient in models (2), (4), (6), error correction tests for evaluating the magnitude of price transmission between different levels of Tehran beef market structure are expressed as the following (Mayer and Von Cramon-Taubadel, 2004).

$$\begin{aligned} H_0 : \sum_{i=0}^{L_1} \alpha_{1,i} &= \sum_{i=0}^{L_2} \alpha_{2,i} \\ H_0 : \sum_{i=0}^{M_1} \beta_{1,i} &= \sum_{i=0}^{M_2} \beta_{2,i} \\ H_0 : \sum_{i=0}^{N_1} \delta_{1,i} &= \sum_{i=0}^{N_2} \delta_{2,i} \end{aligned}$$

[7]

In first term is null hypothesis (7) the equality hypothesis is the sum of variable coefficients of increases of 1Kg live cow in farm in time, t to L_1 of its previous period with sum of variable coefficients of decreases of price of 1Kg live cow in farm in time t to L_2 of its previous period of that test. Equality hypothesis of increase and decrease effects of price of live cow in farm means that any changes in decreases and increases of price of live cow results in the same reaction in retail price of beef. In other word, there is symmetry in magnitude of price transmission. In second and third terms of this null hypothesis there is symmetry in magnitude of price transmission from slaughterhouse to retail and farm to slaughterhouse. If null hypotheses (7) fail it means that processing and marketing factors of beef get more marginal profit than marketing expenses. If the correctness of second term of null hypothesis is rejected it means getting more profit by retailers, while the rejection of third term of this hypothesis means getting more profit by processing and marketing of beef. So awareness from the way of price transmission in each level of beef market is important for making policies in different parts of price structure of market of these goods.

5- Speed evaluation test of price transmission

For evaluating of price transmission speed between different levels of Tehran beef market structure by using error correction test estimated coefficients of models (2), (4) and (6) are used in this form.

$$\begin{aligned} H_0 : \alpha_{1,1} &= \alpha_{2,1}, \alpha_{1,2} = \alpha_{2,2}, \dots, \alpha_{1,L_1} = \alpha_{2,L_2} \\ H_0 : \beta_{1,1} &= \beta_{2,1}, \beta_{1,2} = \beta_{2,2}, \dots, \beta_{1,M_1} = \beta_{2,M_2} \\ H_0 : \delta_{1,1} &= \delta_{2,1}, \delta_{1,2} = \delta_{2,2}, \dots, \delta_{1,N_1} = \delta_{2,N_2} \end{aligned} \quad [8]$$

In first term of null hypothesis in (8) the equality hypothesis is considered for each coefficients of increase and decrease of price of one Kg live cow in farm in time, t and its lag. Accepting of null hypothesis in this test means that increases and decreases of price of one Kg live cow in farm in all durations or periods are transmitted equally to retail prices. Also, the effect of one variable of price in level of farm, without considering the change (increase or decrease), it takes a certain time to observe retail level. So accepting this hypothesis mean that price transmission speed from farm to retail is symmetric. In second and third term, this null hypothesis is symmetry in price transmission speed from slaughterhouse to retail and farm to slaughterhouse of test.

6- Price transmission evaluation test in short and long run

In order to study or consider the way of price transmission in market structure in a long run by using error correction test the equality hypothesis of coefficients of isolated error term must be tested. This hypothesis is equal with null hypothesis of price symmetric transmission in each of models which according to price transmission models in Tehran beef industry is expressed as the following from:

$$H_0 : \varphi^+ = \varphi^-$$

$$H_0 : \mu^+ = \mu^-$$

$$H_0 : \psi^+ = \psi^-$$

[9]

The first term of null hypothesis (9) indicates that any positive or negative deviation from long run relation between retail and explanation variables of models, has equal and symmetric effect on retail price changes the second and third terms of this hypothesis shows the presence of this symmetric effect between retail and slaughterhouse and between slaughterhouse and farm like two previous hypothesis.

Statistical society of research is all column or vertical level of Tehran beef market which includes farms, slaughterhouses, and retailers of Tehran province.

In present research monthly price data in 2002- 2010 have been used for studying or considering the price transmission of beef in different levels of Tehran market.

RESULTS

Studying the reliability of variables of model by using generalized Dickey Fuller tests (ADF) and Elliot & et al (ERS) showed that none of variables of model was any reliable and all of them became reliable with one degree differential. In other words, all variables of model that is live cow price, price of beef in slaughterhouse, retail price of beef and foods