Price Transmission in Iranian Wholesale-retail Meat Market: Implications for Market Power

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ABSTRACT

Asymmetric price transmission affects the welfare of producers and consumers leading to a decrease in the efficiency of the market system through increasing the marketing margin. That is why the analysis of the price transmission is of great importance. The current study aims to investigate simultaneously the market power of meat suppliers in retail market through a mixed model and the price transmission trend between wholesale and retail meat markets using a two-regime model. For this purpose, quarterly data for the period 1994-2013 were used. Results indicated that the exercise of market power is possible for retail suppliers through charging higher prices only for a short period in a year and such an insignificant market power induces a welfare effect of as low as 0.34%. Moreover, in the second regime with higher probability, a price increase in the wholesale level is transmitted to the retail level with a higher coefficient in a long term, which is important in terms of policy making. On the other hand, an asymmetric price transmission was observed in a medium term, short term and long term and it was found that the asymmetry is not the same in two regimes. According to the probability of regimes, there can be more severe price transmission from wholesale level to retail level in most cases.

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INTRODUCTION

The process of price transmission is correlated with the efficacy of marketing system and can affect the welfare of producers and consumers (Yavari et al., 2014). Based on the classic economic theories, if the prices in a perfectly competitive market change for any reason, the change is transmitted to different levels of the market and there is a symmetric price transmission in the market. However, empirical findings show that food market is not of perfect competition type. Peltzman (2000) studied 282 different products including 120 agricultural products as well as Kim and Ward (2013), who studied 100 U.S. food products. They concluded that the asymmetric price transmission is a rule rather than an exception. If the farm price rises, the asymmetric price transmission results in a rapid increase in the retail price while when the farm price decreases, the retail price does not fall as much and the difference between these two prices, called the "marketing margin," increases (Tomek and Robinson, 2003). Since the quality of transmission of a certain product price is

affected by the nature and structure of its market, it can also be influenced by the capability of product warehousing, availability of non-competitive structures and the use of market power.

Empirical studies have considered the market power of manufacturing firms as the main reason of asymmetric price transmission. Liang (1989) and Canan and Cotterill (2006) discussed the concomitant use of the market power and price transmission trend in their studies. If processing and marketing services of a product use their market power, they are not able to completely transfer the changes of primary product price and the marketing inputs to the final product price. In other words, the impact of producer price increase or decrease on consumer price may no longer be symmetric. Asymmetry in price transmission sometimes brings huge profits for the marketing intermediaries through affecting the marketing margin and decreases the marketing system effectiveness through reducing the producers' welfare. In many studies on price transmission, the non-competitive market structure was mentioned as the cause

of asymmetry (Meyer and Cramon-Taubadel, 2004). On the other hand, some, like Ward (1982), believes that concerns about decline in the market share following the increase in price under the market power and monopoly condition leads to the faster transmission of price decrease, compared with the transmission of price increase. There are few empirical studies conducted on the relationship between the market power and asymmetric price transmission. For instance, Guillen (2010) investigated the price transmission in three market stages as ex-vessel, wholesale and retail, in the presence of market power for Spanish seafood products and concluded that the market power and asymmetric price transmission are significantly important.

The asymmetric price transmission is in the form of faster and more complete transmission of price increase than the price decrease (positive price transmission) in most of the studies. Bailey and Brorsen (1989) indicated that in the U.S. beef and veal market, margins in packaging units may decrease in the short term trying to maintain the full capacity, or nearly full, of the units activities. In Iran, it was found that there was an asymmetric price transmission between the farm and retail markets of the chicken meat (Hosseini and Nikookar, 2006; Hosseini et al., 2008; Ghadami et al., 2010; Moghaddasi and Nuroozi, 2010; Pishbahar et al., 2015) and red meat (Hosseini and Ghahremanzadeh, 2006; Nikookar et al., 2010; Moghaddasi and Nuroozi, 2010; Yavari et al., 2014) and faster increase of price was transmitted from the farm market to the retail market, compared to the price decrease. However, there was symmetric price transmission in some cases. For example, Bakucs and Ferto (2006) evaluated the farm-retail price transmission in the Hungary's pork market in both the short-run and long-run and found it asymmetric. Jezghani et al. (2011) investigated the vertical price transmission in the Iranian rice marketing chain. Results indicated that the price transmission in the producer-retail level from producer to retailer as well as the wholesale-retail level was asymmetric while it was symmetric in the producer-wholesale level.

Some studies also examined the price transmission between the domestic and world markets. Kilima (2006), for example, investigated the asymmetry in the sugar price transmission from the global market to the domestic market in Tanzania and the results showed that there was an asymmetric price transmission between world and domestic markets of this product. Yousefi and Moghaddasi (2013) studied the price transmission from world to the Iranian domestic markets of wheat, barley and rice. Based on the results, the transmission of the global price shocks to the domestic market in the long-term is more than the short term. Moghaddasi (2009), Farajzadeh and Esmaeeli (2010) and Shahikitash and Omrani (2014) concluded an asymmetric price transmission between the domestic and export prices for the agricultural export products in Iran.

Further, Bor et al. (2014) examined the farm-retail prices transmission in the Turkish milk market using an error correction model. Results showed an asymmetric positive farm-retail price transmission. Namely, an increase in the farm prices transmitted faster to the retail prices than a decrease, resulted in a decrease in consumers' welfare. Furthermore, the results indicated that

there was market power in the milk marketing chain in the turkey leading to an asymmetric price transmission. According to the study done by MacLaren (2013), Digal and Ahmadi-Esfahani (2002) and Wang et al. (2006), the market power and imperfect competition lead to an asymmetric price transmission in the food processing sector.

Food and agro-processing industries constitute 18.3% of the total Iranian processing industries and 15.1% of the total employment. Further, 8.93% of the total investment and 9.64% of the total value added of the industry belong to these sectors (Statistical Center of Iran, 2014). Iranian livestock and poultry industry with more than one percent of the total industry sales is considered as one of the centralized industries (Khodadadkashi, 2008). Given the importance of meat in nutrition and possibility of the non-competitive market in the meat industry, evaluating the market power and pattern of price transmission using the appropriate tools and collecting more information are required in order to better understand the local market and to make more appropriate decisions. Price transmission in the supply chain of a product is one of the most important factors affecting welfare of the producers, consumers and marketing agents. In this regard, the price transmission and market power in the Iran's meat industry were simultaneously studied in the current paper using an integrated model.

2. THEORETICAL IMPLICATIONS

Each livestock and poultry slaughter unit is considered as a firm producing a homogenous product (q) using the live livestock and poultry (x) and other marketing inputs (m) and sells the product in a perfect competition market at a certain price (p). Since the share of each unit is very small, compared to the overall market size, the market is non-competitive for non-agricultural inputs such as work force, energy, etc. However, an individual firm can benefit from its market power in the market of live domestic livestock and poultry or its product.

Following the Schroeter and Azzam (1991), it is assumed that the marketing cost function is separable into the agricultural (live livestock and poultry) and marketing inputs and the relationship between each agricultural input and the product is also assumed as a constant ratio (i.e., $q=\lambda_x$, $\lambda=1$). Hence, if the profit is calculated based on each firm in the industry, the profit function (π) for the ith marketing or retailing firm in the ith region can be stated as follows:

$$\pi_{ij}=pq_{ij}-w_i(Q_j,z)q_{ij}-c_{ij}(q_{ij},v) \tag{1}$$

Where q_{ij} is the amount of the firm's product (output), $w_i(Q_j,z)$ is the price of the agricultural input (live livestock and poultry) in the ith region, z is the transitional supply vector for exogenous variables, v is the price vector of nonagricultural inputs and $c_{ij}(q_{ij},v)$ is the production cost function for the ith firm in the ith region. The first order condition for maximizing the profits is as follows:

$$\frac{\partial \pi_{ij}}{\partial q_{ij}} = (p-w_j) - \frac{\partial w_j \partial Q_j}{\partial Q_j \partial q_{ij}} q_{ij} - \frac{\partial c_{ij}}{\partial q_{ij}} = 0 \tag{2}$$

The retail price is stated as follows through converting the Equation (2) into the elasticity:

$$p = w_j + \theta_{ij}(\varepsilon_j^{-1}Q) + mc_{ij} \qquad (3)$$

Where, $\theta_{ij}=(\partial Q_j/\partial q_{ij})(q_{ij}/Q_j)$ indicates the rough elasticity of the local inputs market for the ith firm in the ith region, $\varepsilon_j=(\partial Q_j/\partial w_j)(Q/Q_j)$ is the slope of the input supply function in the ith region; the share of ith region in the national market is obtained when it is reversed, $Q = \sum Q_j$ is the total input amount/national product and mc_{ij} indicates the final cost of the ith firm in the ith region. Following the Schroeter and Azzam (1991), it was supposed that ε_j is equal in all regions.

If Equation (3) is multiplied by q and the results are summed for all firms within the region as well as for all regions. After it is divided by Q, the following equation is formed:

$$\sum_i \sum_j p \frac{q_{ij}}{Q} = \sum_i \sum_j w_j \frac{q_{ij}}{Q} + \sum_i \sum_j \theta_{ij}(\varepsilon_j^{-1}Q)\frac{q_{ij}}{Q} + \sum_i \sum_j mc_{ij}\frac{q_{ij}}{Q}$$
$$(4)$$

If $\varphi_{ij}=q_{ij}/Q$, according to the above assumptions, the Equation (3) is stated as follows:

$$\sum_i \sum_j p\varphi_{ij} = \sum_i \sum_j w_j\varphi_{ij} + \varepsilon_j^{-1}Q\sum_i \sum_j \theta_{ij}\varphi_{ij} + \sum_i \sum_j mc_{ij}\varphi_{ij}$$
$$(5)$$

If p, θ, W and MC represent the weighted average values, the related average price as shown with the Equation (5) can be expressed as follows:

$$P=W+MC+\theta(\varepsilon^{-1}Q) \qquad (6)$$

The Equation (6) shows the optimal behavior of an industry having monopsony power for purchase in the agricultural inputs market, where products are sold in a competitive market as well as nonagricultural inputs that are purchased in the competitive markets. The rough elasticity θ measures the monopsony power for purchase applied by enterprises. The rough elasticity decreases to zero because of the perfect competitive market of the agricultural inputs and the retail price is calculated using the following formula:

$$P=W+MC$$

Another from of the Equation (6) facilitating the test for the imperfect competition is as follows:

$$P = MC + W(\frac{\tilde{\varepsilon} + \theta}{\tilde{\varepsilon}}) \qquad (6a)$$

Where $\tilde{\varepsilon} = (\partial Q/\partial W)(W/Q)$ is the price elasticity of the supply curve for the entire farm. Obviously, when $\theta \succ 0$, i.e. the multiple monopsony power (or oligopsony) is applied, one unit increase in the farm gate prices leads to an increase in the retail prices by more than one unit (namely, $\frac{\partial P}{\partial W} \succ 1$).

These calculations are determined using a simple t-test and evaluation of the imperfect competition impact (long term) on the retail-farm prices mentioned in the Equation (6) becomes possible.

3. METHODOLOGY

Most of the agricultural products have high corruptibility and seasonal production trend and their supply function is relatively inelastic in the short term because if the decision-making time is after the start of production, the output is almost constant. Therefore, agricultural outputs and bargaining power of buyers is unchanged in each business cycle. These properties result in the multiple price regimes and this issue can be tested as follows:

$$\text{Regime1}: \quad P = \beta_{11}W + \beta_{12}MC + \theta_1(\varepsilon^{-1}Q)$$
$$\text{Regime 2}: P = \beta_{12}W + \beta_{22}MC + \theta_2(\varepsilon^{-1}Q) \qquad (7)$$

This feature is also consistent with the price behavior observed by Sexton and Zhang (1996) for the fresh lettuce. Two different pricing regimes were recognized in their study: A regime for peak harvest time when the price equals to the harvest cost and another regime for the seasons apart from the peak harvest time when the price is more than harvest costs due to the bargaining between buyers and agents of producers. They used an integrated-constrained estimation model allowing them to evaluate both the retail-farm prices and the market power in the different regimes and the Sexton and Zhang's generalized model was also used in the current study. An advantage of this integrated model is that the pricing regimes cannot have an imposed specific reason, on one hand, and all data properties can be determined, on the other hand. If data indicate more than one regime, the certain regression can be applied to explain the regime.

Mainly, a constrained distribution of prices is stated as follows:

$$f_1(P_i)=\tau_1 f_{i1}(P_i)+\tau_2 f_{i2}(P_i)+\ldots\ldots+\tau_k f_{ik}(P_k) \qquad (8)$$

Where, $\tau_j \succ 0$, and $\int f_j(m)dm = 1$ for all j(s). Therefore, the integrated density function is a possible weighted mean of f_j densities components. Assuming the normal distribution for the prices of the agricultural products, a two-regime pricing model is established as follows:

$$f_i(P_i|\theta)=\tau\varphi_1(P_i|\mu_1,\sigma_1)+(1-\tau)\varphi_1(P_i|\mu_2,\sigma_1) \qquad (9)$$

Where, φj(s) have normal density functions and $\mu_j=X_i\beta_j$(s) are the vector of explanatory variables and parameters. The two-regime pricing model introduced in the Equation (7) is as follows:

$$P=\beta_{21}W+\beta_{22}MC+\theta_2(\varepsilon^{-1}Q_2)+e_2 \qquad (10)$$

Where, e_j(s) are independent and identically distributed error terms.

In the Equation (10), the final cost (MC) is obtained from the cost function (C) defined as a translog function. This kind of function is used because of its appropriate features including the homogeneity in prices and the convexity of the product. Furthermore, features

such as concavity in prices, symmetry and uniformity can be applied and tested (Richards et al., 2001).

According to the empirical tests and theoretical relations resulted from the Equation (10), the process of the producer-retailer price transmission in the desired industries is specified as follows:

$$P_t = \begin{cases} \sum_{i=0}^{n} \beta_{11i}^{+} \Delta w_{t-i}^{+} + \sum_{i=0}^{n} \beta_{11i}^{-} \Delta w_{t-i}^{-} + \beta_{12} MC + \theta_1(\varepsilon^{-1}Q) + e_1 \\ \\ \sum_{i=0}^{n} \beta_{21i}^{+} \Delta w_{t-i}^{+} + \sum_{i=0}^{n} \beta_{21i}^{-} \Delta w_{t-i}^{-} + \beta_{22} MC + \theta_2(\varepsilon^{-1}Q) + e_2 \end{cases} \quad (11)$$

$$\begin{bmatrix} \Delta w_t^{+} = \sum_{t=1}^{T} max(W_t - W_{t-1}, 0) \\ \\ \Delta w_t^{-} = \sum_{t=1}^{T} min(W_t - W_{t-1}, 0) \end{bmatrix}$$

Superscripts '−' and '+' represent the cumulative value of increases and decreases in farm or producer prices. This method entitled "Wollfarm's methodology (1971)" was adjusted by Houck (1977).

A test examining the asymmetry of the price transmission is as follows:

$$H_N : \sum_{i=0}^{n} \beta_{ji}^{+} = \sum_{i=0}^{n} \beta_{ji}^{-}$$

$$H_A : \sum_{i=0}^{n} \beta_{ji}^{+} \neq \sum_{i=0}^{n} \beta_{ji}^{-} \quad (12)$$

H_0 in the Equation (12) is a constrained linear test and t-test is enough for its examination. A likelihood test with an adjusted lag suggested by Wolfe (1971) can be used to determine whether the one-regime or two-regime is more appropriate for data. A simple t-test can be used for integrated-weighted parameter (τ) and testing the two-regime model.

In the market transition from competitive to noncompetitive forms, the industry share increases with an increase in the market power and the industry receives more profits. The producer surplus is a standard for evaluating the impacts resulted from an increase in the purchasing power of agricultural products (Sexton and Zhang, 1996; Richards et al., 2001).

For this purpose, the function of inputs supply is simplified as $w=\beta X^\rho$, where, X represents the supply of the agricultural products or the live livestock and poultry. Difference in the producer surplus (PS_{diff}) between the competitive market structure ($\theta=0$) and imperfect competition ($\theta \succ 0$) is calculated as follows:

$$PS_{diff} = w_c (\frac{w_c}{\beta})^{1/\rho} - (\frac{w_c}{1+\rho\theta})(\frac{w_c}{\beta(1+\rho\theta)})^{1/\rho} \quad (13)$$

Where, w_c shows the price increases under the competitive condition, β and ρ are estimated parameters and θ is the market power. The Equation (13) in a two-regime integrated model is as follows:

$$PS_{diff} = w_c (\frac{w_c}{\beta})^{1/\rho} - \tau(\frac{w_c}{1+\rho\theta_1})(\frac{w_c}{\beta(1+\rho\theta_1)})^{1/\rho}$$
$$- (1-\tau)(\frac{w_c}{(1+\rho\theta_2)})(\frac{w_c}{\beta(1+\rho\theta_2)})^{1/\rho} \quad (14)$$

Where, τ is an integrated weighted average (Richards et al., 2001).

Different tests were performed to estimate the empirical pattern. The unit root test was first carried out to determine the stability of prices. In the next stage, the Akaike information criterion standard was applied to determine the optimal lag number (Akaike, 1974). Also, causal relationship between prices evaluated in two levels of the markets, i.e., producer and retail prices, in the model.

4. DATA

The applied data in this study were collected from the Statistical Center of Iran and the central bank for the period 1994-2013. Data included the quarterly series of the values for some variables such as the rate of salaries and wages, value of produced meat, price per unit of produced meat, energy value, capital reserve, outputs, producer price index (PPI) and consumer price index (CPI). The meat is the final product that its monetary value was considered. The monetary value of the live livestock and poultry as the intermediate inputs was also considered in the production. Depreciation reserve consists of the monetary value of equipment and capital goods used by meat production units. The amount of consumed energy was another intermediate input and included different energies such as electricity, gas and oil and sum of these values constitutes the total consumed energy. The PPI included the weighted average of the meat produced by the meat production units.

5. RESULTS AND DISCUSSION

Given the use of time-series data in this study, stationary was examined using unit root test. It is worth mentioning that the mentioned variables were used in the log form. The stationary test of the variables was performed under the presence of intercept and intercept and process conditions. Results of the test revealed that the variables have not a stable behavior. Hence, the variable stationary was examined for their first difference values. It was found that the first differences are stationary. Furthermore, the casual relationship between the wholesale and retail prices was studied, revealing that there is a wholesale to retail price transmission direction. Thus, the variable of the retail price index was considered as a function of the wholesale price index in the specifications. It should be explained that the price index in the analysis of results means the meat price index and was mentioned as the price index or price in short.

According to the Table 1, a high value was obtained for the log-likelihood statistics in the two-regime model, indicating the significance of the model. Considering the use of the dependent variable lag the generalized method of moments was used in the single-regime model (Table 2) in which the log-likelihood statistics is not available. In addition, the wholesale price index series increased over the selected period and had no decreasing series.

The statistics of τ showed a 28% and 72% probability for the first and second regimes, respectively; indicating that more focus can be placed on the second regime. It also was determined that the average duration of the first regime is almost 1.4 periods, while it is over 4 periods for the second regime. Given the seasonal data used in this study, the second regime may take up to 1 year. However, it has more volatility or variance, namely, repeat cycles of the first regime are less volatile. Clearly, all variables have high significance in the first regime while some variables are not significant even at the 10% significance level. The wholesale price, inverse supply elasticity and the final cost has positive effect in the first regime as it was expected. It means that the increase in the mentioned variables leads to an increase in the wholesale price index. However, the lags of the variable of wholesale price affect the retail price index (Table 3). The presence of positive and significant intercept in the first regime indicates the significant

marketing margin between the wholesale and retail prices. Coefficient of the inverse supply elasticity variable is significant and positive indicating that meat buyers in the wholesale level can exercise market power. Although the coefficient obtained for this variable is not large, the presence of positive and significant margin along with significant coefficient of inverse supply elasticity could mean that there is a level of market power.

The coefficient of the marginal cost variable in the first regime is at a high level indicating that an increase in the final cost of meat production at the wholesale level by 1% can increase the meat price at the retail level by 0.3%. In other words, an increase in production costs at the wholesale level is transferred into the retail level.

The estimated coefficient for the wholesale price variable in the current period or short term is in a very high level, showing that the retail price tends to increase by over 4% with an increase in the wholesale price by 1%. Accordingly, the increase in retail price is alternately moderated in the next periods. The sharp rise at the retail price level can also indicate the possible exercise of market power. Since the possibility of final consumers' reaction is limited in the short term, a large increase in price is experienced. It seems that the price always tends to decrease during the three next cycles

Table 1: Results of estimating the two regime-model of the wholesale-to-retail price transmission in the meat industry

Variable	Regime 1			Regime 2		
	Coefficient	SD	Z statistics	Coefficient	SD	Z statistics
Intercept	0.0955***	0.00009	1007.8	0.038***	0.002	16.89
Increasing series of wholesale price	4.12***	0.082	49.8	0.0566	0.437	0.129
Invers supply elasticity	0.0023***	0.00024	9.89	0.0022	0.006	0.387
Marginal cost	0.276***	0.001	254.2	−0.0557**	0.028	-2.003
First order lag of the increasing series of the wholesale price	−2.127***	0.117	−18.03	1.9794*	0.536	1.825
Second order lag of the increasing series of the wholesale price	−4.132***	0.060	−68.10	1.0986*	0.616	1.78
Third order lag of the increasing series of the wholesale price	−0.539***	0.049	−10.83	−0.987	1.106	-0.892
Fourth order lag of the increasing series of the wholesale price	1.83***	0.081	22.36	1.806*	0.965	1.87
Fifth order lag of the increasing series of the wholesale price	1.30***	0.067	19.14	0.2231	0.351	0.63
Statistics	Log likelihood 231.46					

*.**.***10%, 5% and 1% significance level, respectively. SD: Standard deviation

Table 2: Results of estimating the one regime-model of the wholesale-to-retail price transmission in the meat industry

Variable		Coefficient	SD	t statistics
Intercept		−0.011***	0.0041	−2.64
Increasing series of wholesale price		1.618***	0.1985	8.14
Invers supply elasticity		0.034*	0.0185	1.85
Marginal cost		0.0037	0.0212	0.175
First order lag of the increasing series of the wholesale price		−0.360	0.5728	−0.62
Second order lag of the increasing series of the wholesale price		−6.149***	1.4667	−4.19
Third order lag of the increasing series of the wholesale price		10.254***	1.5459	6.63
Fourth order lag of the increasing series of the wholesale price		−4.648***	0.5491	−8.46
Fifth order lag of the increasing series of the wholesale price		−0.021	0.0446	−0.46
Variable		1.039***	0.0797	13.02
Statistics	R^2		Q (1)	Q (2)
	0.936		0.127 (0.93)	0.126 (0.72)

*.**.***10%, 5% and 1% significance level, respectively. SD: Standard deviation

Table 3: Elasticity of price transmission between the retail and wholesale markets

Variable	Integrated regime	Regime 1	Regime 2
Increasing series of the wholesale price			
Short-run	1.618***	4.120***	0.056
Long-run	0.693*	0.453***	3.176***
Difference	−0.924***	−3.666***	3.120***
t statistics	−2.82	−42.62	5.05

*,**,***10%, 5% and 1% significance level, respectively

due to that sharp rise. In other words, the price at the retail level tends to decrease until three next cycles. The price decrease in two cycles after the current period is particularly at a high level.

In the second regime, the coefficients of variables are at much lower such that the coefficient of the wholesale price variable is even less than 1%. Further, they have no statistical significant effect. Lack of statistical significance of the variable of inverse supply elasticity as the most important distinction between the two regimes is another key point, namely having positive effect is expected, but its statistical significance is at a low level. Based on the probability of the regimes, it can be noted that the possibility of exercise of market power by the buyers of the meat in wholesale market is also at a low level to the same degree. In this regime, the presence of positive and significant intercept can also indicate the availability of absolute marketing margin- though at a low level- between the two markets. However, this margin may be attributed to marketing costs.

The negative coefficient of the marginal cost variable is another main difference between the two regimes. The coefficient must be positive while it was found that increase in the marginal cost at the wholesale level leads to a decrease in the retail price in the second regime. A 1% increase in the marginal cost is supposed to decrease the retail price by 6%. In this regard, it can be stated that the supply of substitute goods may have cyclic fluctuations, namely, despite the increase in the marginal cost at the meat wholesale level, there are favorable conditions for supply of the substitute goods. Therefore, the meat suppliers not only cannot exercise higher prices resulted from increases in the production costs but also they have to decrease the proposed retail prices when facing the substitute goods. Furthermore, the periodic fluctuations in the retail price of meat can be observed.

In addition, the wholesale price has no significant impact on the retail price in the current period and can play a significant role after four next cycles and this impact is significantly increasing. In the third cycle, the price impact lacks the required significance. In other words, the impact of retail price increase can be increasing for the one next year.

The results of the single-regime model was summarized in the Table 2. In this specification, the first lag of the independent variable was used due to autocorrelation between the residuals and the generalized method of moments was applied considering the endogeneity of this variable. Autocorrelation between the

residuals was greatly resolved and the specification could explain more than 93% of the changes in the CPI.

The sign of variable coefficients is based on expectation and has a great level of statistical significance for the most of the variables in such a way that it has statistical significance for all variables in the 1% level except for the marginal cost and the first and fifth lags of the wholesale price variable. The coefficient of the inverse elasticity variable implies the presence of the market power. Thus, the retail price is expected to be over 3% higher than the wholesale price while holding other conditions constant. However, based on the constant coefficient, if the variables including wholesale price do not tend to increase, the retail price tends to decrease to a lower level than the wholesale price (the decrease is not large). The continued rise in the wholesale price during the study prevented the creation of the negative marketing margin. The coefficient of the inverse elasticity variable is significant at 10% level.

The coefficient of the marginal cost, unlike the two previous specifications, does not have significant effect and has a very low coefficient. According to the presented analyses, this finding can be the resultant of the previous two-regime specification as well as the superiority of the two-regime model. On the other hand it was revealed that the relationship between the marginal cost and RPI is dependent on the regime type and is not the same in all cycles.

The estimated coefficients for the wholesale price also indicates a high volatility in such a way that its impacts have high coefficients in addition to the change of direction in different cycles. A 1% increase in the wholesale price leads to an increase in the retail price by 1.6% in the short-run. It has no impact in the second cycle while it greatly affects the retail price alternately in the second to fourth cycles. The total impact was evaluated in the Table 3.

The calculated coefficients for the wholesale price variable in the single-regime and two-regime models were compared in the Table 3. The coefficient of the single-regime model is between the two regimes of the two-regime model. The difference between the two regimes is an important point. In fact, the impact of the wholesale price is at a high level in the first regime while it is insignificant in the second regime. However, a large coefficient was obtained for the wholesale impact in the long run. The single-regime model has the same prediction that the first regime has while there is a significant difference between the short run and long run in all three regimes in terms of the coefficient of wholesale price variable.

6. CONCLUSION AND RECOMMENDATIONS

The current study was conducted to analyze the market power of the suppliers in the retail meat market that buy the output from wholesale market and to investigate the wholesale-to-retail price transmission trend. The main difference of the present study with other empirical studies is that it evaluates the price transmission trend in two levels including the wholesale (or processing) and retail in the presence of market power examination. According

to the results, it was determined that the two-regime model can better explain the conditions in the meat market, compared to the single-regime model. The reason is that no significant margin was obtained between the wholesale and retail prices in the single-regime model unlike the two-regime model. Another important issue is the difference between variables such as the marginal cost of production, which is opposite in the two regimes. This finding implies that relying on the results of single-regime model can be far from the real condition. Large fluctuations in the pattern of wholesale price impact in different cycles is another discriminating feature that is intensified in the next cycles, while the range of wholesale price coefficient changes tends to decrease in the regime-switching models. Therefore, the findings of the two-regime model should be more focused.

Generally, meat suppliers have limited opportunities to exercise the market power during a year in most of the production cycles but there is a positive marketing margin between the wholesale and retail markets. However, this margin simply may be attributed to the marketing costs incurred by marketing agents. Also, in line with this finding the simulation result reveals that sellers in wholesale market loss only 0.34% of their revenue because of the buyers' market power. The probability of market power exercise associated with the probability of regimes is only about less than 30%. There is a high level of the marketing margin in this regime, namely, imposing the higher prices in the retail market is possible for the suppliers of the wholesale market for a short period. On the other hand, there is serious threat of market power exercise in some cases to the extent that it was even observed that not only there is no opportunity for wholesale suppliers to increase the retail price in the second regime with over 70% probability after an increase in the marginal costs but also the coincidence of mass supply of the substitute goods with the increase in final production prices forces them to decrease the prices. Based on the results, it can be implicitly found that the mass supply by many individual units may be the reason for the limited exercise of market power in by wholesale market buyers. This means that increase in meat supply is possible considering the industrial supply of meat in many seasons or periods of a year and an increase in the number of competitors in the retail market limits the exercise of market power. Large fluctuations in the forage supply and production is not yet expected to affect the wholesale market in the industrial meat production since there is the possibility of forage storage in addition to the animal-feed imports. Furthermore, the difference between the coefficients of the wholesale prices shows that the price increase at the wholesale level in the second regime with higher probability is transmitted to the retail level with a higher coefficient indicating that it can be important in terms of policy-making. In other words, if the first regime is considered to be in accordance with the mass supply period, the price increase is strongly transmits to the retail level with an increase in the wholesale price leading to an increase in general level of prices due to the necessity of keeping meat in the consumption basket. However, the longer period in the second regime can be desirable to regulate the market considering that the price increase in the wholesale level and sever transmission of the increased price to the retail market do not take place at the same time. Further, dealing with the meat price increase is possible.

Although investigating the asymmetry in the price transmission between the wholesale and retail levels was not realized here due to the increasing wholesale price during the study, asymmetric price transmission was observed within a medium term, short run and long run and it was found that such asymmetry was not the same in the two regimes. According to the probability of regimes, there can be more severe price transmission from the wholesale level to the retail level in most cases, showing some evidence of insignificant opportunities to exert market power by retail market supplies.

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