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The Evaluation of Asymmetry in Price Transmission and Market Power in Iran Sugar Production Industry

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Abstract

Asymmetric price transmission in production institutes can be a reason for the existence of market power. In this regard, by the help of an integrative sample, this study simultaneously analyzes the price transmission between production markets and retails markets of sugar in the presence of the parameter of market power. For this purpose, the seasonal data of the required variables during the years 1995-2013 was used. In order to meet the study objectives, the behavior of the retails price of sugar was evaluated in the framework of two regimes of different changes which were compatible with nature of presenting agricultural products that are widely supplied in the harvest seasons. Also, the inverse elasticity of product supply was used as the parameter of market power. Considering the more probable regime (second regime), it was realized that the marketing elements at the wholesale level intend to price transmission increase more intensively than price decrease to the retail trades level. In this regime, asymmetric price transmission and existence of market power were approved. In the first regime, market power was much more and considering the fact that it has the 30% probability of happening, it has more compatibility with the seasons when supply is abundant. In these seasons, sugar production and refining units increase the market power and create a monopsony market in buying the inputs.

Keywords: price transmission, market power, sugar production

1. Introduction

In the agricultural products, sugar as a strategic product is always considered by governments. Sugar for consumption is supplied through domestic production and import. By counting the annual consumption per capita as 30 kg sugar in the country, the level of annual sugar requirement is measured as 2.3 million tons. Approximately half of this quantity is produced domestically and the other half is supplied by import (Customs Department of Islamic Republic of Iran, 2014). Therefore, it is required that more efforts are made for more identification of domestic markets so that appropriate policies can be taken. For this purpose, it is required that by doing more studies in this field, more data be collected and by the use of appropriate criteria, the market structure and market power in the transformational industries of agriculture sector be studied more. In addition to studying the market structure of these industries, the way of price transmission process in the chain of supplying goods has to be studied as well. This is because two of the most effective factors on the welfare of producers are marketing of an item and its consumers. The methodology of price transmission of a product is affected by nature and structure of the market, so much so that storability of the products, the existence of non-competitive structures, and using market power influence the way of price transmission. Simultaneous use of market structure concepts and the pattern of price transmission are explained in studies of Liang (1989), and Canaan and Cotterill (2006).

In the empirical surveys, the utmost important reason for asymmetric price transmission is mentioned to be the market power of productive institutes. Production industries of agricultural products do not usually provide all conditions of total competition in the market like an affluent number of producers and non-concentration on industry (Meyer & Van Cramon-Taubadel, 2004). Also, the empirical studies have shown that in practice, the market of agricultural products and food industry are non-competitive (Brown & Yücel, 2000; Bornstein et al., 1997; Bailey & Brorsen, 1989).

If processing and marketing institutes of a product use their market powers, they can prevent full transmission of changes in the initial product price and inputs of marketing to the final product. In other words, it is possible that

the effect of increasing or decreasing of producers' price would not be symmetric to the price of the users. Asymmetry price transmission, by influencing the market margin, sometimes brings huge profits for the marketing brokers and by decreasing the welfare of the producers it decreases the efficiency of the marketing system.

Food industries and transformational industries of agriculture sector include 18.3% of the whole industries of the country and in addition to that, 15.1% of employment, 8.93% of investment and 9.64% of added value of industry belong to this sector (Iranian Statistics Center, 2014). Considering the few number of processing industries in the market of transformational industries and food industry in Iran, existence of non-competitive markets and asymmetric price transmission in these industries is probable and subject to questions. In case there is asymmetry in price transmission, price fluctuations lead to an increase of market margins. High margins of the markets of food and agricultural products which are not typically compatible with the operated marketing have always been subjected to considerations. It is so much that according to carried out studies, approximately 50% of the paid price of the consumers for the product is for the marketing expenses (Dehdashti & Seidzadeh, 2006). Therefore, not only is it required that the quantity of competition in the transformational part of agriculture sector receive more attention, considering the concept of asymmetrical transmission too is significantly important.

Pultzman (2000) in a comprehensive study of 282 different products including 120 agriculture products stated that asymmetric price transmission is more a rule than an exception. Therefore, the presented standard theory for the markets is not correct, because this theory is unable to predict and explain an asymmetrical modification of price. On the other hand, Gauthier and Zapata (2001), and Van Cramon-Taubadel and Meyer (2000) suggested that in dealing with the issue of asymmetry, because of methodological problems related to empirical tests, it is necessary to stay on the safe side. Two issues have made asymmetric price transmission highly important. The first one is doubt about the correctness of economic theories and the second one is the necessity of change in the previous welfare deductions (Meyer & Cramon-Taubadel, 2004). This issue itself, in its own turn, critically challenges the selected policies. Asymmetric price transmission can appear in the speed or size or in both of them.

Most carried out studies on price transmission have mentioned the structure of non-competitive market as the reason for asymmetry (Meyer & Cramon-Taubadel, 2004). On the other hand, some researchers like Ward (1982) believe in condition of market power and monopoly, worry about the decrease of the market's share after an increase of price will lead to faster transmission of a decrease in price compared to its increase. So far, few empirical studies have been conducted on testing the relationship between the market power and asymmetric price transmission. The existence of modification costs and some executive costs arising from modification of the activity volume are mentioned as other main sources of asymmetrical transmission (Meyer & Cramon-Taubadel, 2004). Of course, highness of execution costs and modification can be the reason of asymmetric price transmission, because it has been identified that averagely 27% to 35% of the net profit margin consist of these costs (Dutta et al., 1999; Luis et al., 1997).

In most studies, the asymmetric price transmission is observed as the faster and more perfect price transmission increase compared to price decrease (positive price transmission). However in the beef market of the US, Bailey and Brorsen (1998) showed that in short-run, it is possible that the margins in the packing units could reduce while struggling for maintaining the activity of unit in the surface (or close to) full capacity. In Iran as well, it was clarified that in the chicken market (Husseini & Nikokar, 2006; Husseini et al., 2008; Ghadami Kouhestani et al., 2010) and beef market (Husseini & Ghahreman Zadeh, 2006; Nikokar et al., 2010) there is asymmetric price transmission between the farm price and the retails price, and price increase is transmitted faster than its decrease from the farm to the retails market. For sugar as well, Kilima (2006) studied asymmetry of price transmission from the global market to the domestic market in Tanzania. His findings showed that price transmission between the global market and the domestic market of this product is asymmetry. Of course about the agriculture products as the comprehensive study of Pultzman (2000) showed as well, asymmetric price transmission is generally more common than symmetric price transmission. In this regard, Aguiar and Santana (2002) stated in a general review of the studies that about the agricultural products, it is generally expected that the price transmission process is observed as asymmetry. Of course, there are some cases of symmetry as well. For example, Bakucs and Ferto (2006) evaluated price transmission between the farm price and retails price of pork meat in Hungary in the short-run and in the long-run as symmetry. Jazghani et al. (2011), in the marketing chain of rice in Iran, studied the vertical price transmission. Their studied scales showed that the price changes of producers immediately are transmitted to the prices of wholesale and retails. In the used models, transmission

from the producer to retails price as well as from wholesale to retails price was asymmetry, but price transmission from producer to wholesaler is symmetry.

Efforts of different studies were usually on the sources of creating asymmetric price transmission. Some examples are Ward (1982), Bailey and Brorsen (1989), and Damania and Yang (1998) which count the market power as significant. Also, Bulk et al. (1998), as well as Brown and Yücel (2000), introduced collusion for more profit as a factor of asymmetrical transmission. Bor et al. (2014), also by the use of the error correction model, studied asymmetry in price transmission from the farm to retails in the milk market in Turkey. The results showed positive asymmetry in price transmission from the farm to the retails price. It meant that increase of prices on the farm transmitted to the retail prices faster than their decrease, hence the welfare of the consumers decreased. In addition to that, the results showed that the market power in the marketing chain of milk in this country existed which led to asymmetry in price transmission. Also, the results of the studies of Mc Loren (2013), Digal and Ahmadi Esfahani (2002) and Wang et al. (2006) showed that the market power and defected competition lead to asymmetry in price transmission in the processing sector of foodstuff.

For clarifying the way of price transmission, by the use of an integrated pattern in this study, asymmetric price transmission was simultaneously used with the market structure in the sugar production industry. It has to be mentioned about sugar that considering the fact that it is significantly important among the consumed products of families, it has a lot of use as well in the agriculture transformational industries and production of other food industry. Although the global average of sugar consumption is annually 23 kg per capita, this index has gone beyond the world standard in Iran and has reached 30 kg (FAO, 2014).

2. Theoretical Principles

In this study, consider the sugar marketing industry as a firm, which produces a homogenous product (q) using agricultural input (x) along with other inputs (m) and sells its product in a competitive market at a price p. The market for nonagricultural inputs such as labor, electricity and etc is likely to be competitive because the share of the industry is much smaller than the overall size of the market. However, an individual firm may enjoy market power in a regional-agricultural input market or in national output market.

Following Schroeter and Azam (1991), we assume that the marketing cost function is separable in agricultural input and marketing inputs. We also assume that the relationship between the alone input and output is one of the fixed proportions (*i.e.* $q = \lambda x$, where, $\lambda = 1$). Then the profit function (π) of the i-th marketer/retailer in the j-th region can be expressed as:

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

Where, q_{ij} is the firm input as well as output quantity, $w_j(Q_j, z)$ is the price of agricultural inputs in the region j, z is the vector of supply-shifting exogenous variables, v is the vector prices for non-agricultural inputs and $c_{ij}(q_{ij}, v)$ is the processing cost function of the i-th firm in the j-th region. The first-order condition for firms profit maximization is:

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

Converting Equation (2) to elasticities, the retail can be expressed as:

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

Where,

$\theta_{ij} = (\partial Q_j / \partial q_{ij})(q_{ij} / Q_j)$ is the regional input market conjectural elasticity of firm i in the region j;

$\varepsilon_j = (\partial Q_j / \partial w_j)(Q / Q_j)$ is the slope of input supply function in the region j times the inverse of region j national market share;

$Q = \sum Q_j$ is the total national input/output quantity; and,

mc_{ij} is the marginal processing cost of the firm i in the region j.

Following Schroeter and Azam (1991), we assume that ε_j are the same and equal to the national value ε.

Equation (3) is multiplied by q and the result is summed over all firms within the region and over all regions, then divided by Q, we have:

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

Let $\varphi_{ij} = q_{ij}/Q$, then with the assumptions made above, Equation (3) can be written as below:

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

if P, θ, W and MC show the average weight values, the mean value of the price shown in the relation (5) could be written in this form:

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

Equation (6) shows the optimal behavior of firm with monopsony power in the agricultural input market but selling in a competitive output market and purchasing non-agricultural inputs in competitive markets. The conjectural elasticity parameter θ measures the extended monopsony power exercised by the firm. However, when the farm input market is perfectly competitive, the conjectural elasticity parameter reduced to zero and the farm retail price relationship becomes $P = W + MC$.

An alternative Equation (6) that facilitates testing for imperfect competition is:

$$P = MC + W\left(\frac{\widetilde{\varepsilon} + \theta}{\widetilde{\varepsilon}}\right) \tag{6a}$$

Where, $\widetilde{\varepsilon} = (\partial Q/\partial W)(W/Q)$ is the price elasticity of the vector of aggregate farm supply curve. From Equation 6a, it is immediately clear that when $\theta \succ 0$ (i.e. middlemen exercise oligopsony power), a one unit increase in the farm price causes the retail price to increase by more than one unit (*i.e.* $\frac{\partial P}{\partial W} \succ 1$).

Given this theoretical prediction a simple T-test will be constructed to evaluate the overall (long-run) impact of imperfect competition on farm-retail price relationship implied in Equation (6a).

3. Methodology Research

Most agricultural products are perishable, exhibit a seasonal production pattern, and the supply function is relatively price inelastic in the short-run owing to production acreage being fixed by decisions made in the past. For these reasons, farmer and buyers bargain over a fixed quantity in each trading period. These features are posited to give rise to multiple pricing regimes, which we test using the following specification:

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

This characteristic of agricultural crops market is consistent with the pricing behavior for fresh lettuce observed by Sexton and Zhang (1996). In that study two pricing regimes are identified: a harvest- or peak season regime where price is equal to harvesting cost, and an off-peak regime where price exceeds harvesting costs and is determined as a result of bargaining between buyers and producers.

Our model generalizes Sexton and Zhang's in that a finite mixture estimation procedure is used that permits both the producer–retail price relationship and the market power parameter to vary between regimes. An advantage of the mixture procedure is that the pricing regimes do not have to be imposed a priori, but rather can be identified through the properties of the data. If the data indicate more than one regime, auxiliary regressions can be used to identify factors that may explain regime membership.

In general, a finite mixture distribution of a price is expressed as:

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

Where, $\tau_j \succ 0$, $\sum \tau_j = 1$ and $\int f_j(m)dm = 1$ for all j. Thus, the mixture density function is a probabilistically weighted average of component densities, f_j. Assuming that agricultural product prices are normally distributed, a two regime pricing model can be expressed as:

$$f_i(P_i|\theta) = \tau\varphi_1(P_i|\mu_1, \sigma_1) + (1-\tau)\varphi_2(P_i|\mu_2, \sigma_2) \tag{9}$$

Where, φ_i are normal density functions and $\mu_j = X_i\beta_j$ are vectors of explanatory variables and associated parameters. Using this framework, the two-regime agricultural product pricing model defined in Specification 7 can be expressed as,

$$P = \beta_{11}W + \beta_{12}MC + \theta_1(\varepsilon^{-1}Q_1) + e_1 \quad \text{with a probability of } \tau$$

Or,

$$P = \beta_{21}W + \beta_{22}MC + \theta_2(\varepsilon^{-1}Q_2) + e_2 \quad \text{with a probability of } 1-\tau \tag{10}$$

Where, e_j are independent and identically distributed (i.i.d.) error terms. In Equation (10), the marginal cost function, MC, is obtained from the cost function, C, which is defined as a translog cost function. We use this

function form because it has appropriate features including equality in prices and convexity in the product. In this function form, characteristics of concavity in prices, symmetry and monotony can be imposed and tested (Richards et al., 2001).

Based on these empirical tests and the theoretical relationship derived in Equation (10), the producer-to-retail price transmission process for the sugar marketing industry was specified as:

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

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

Where, superscripts + and - denote cumulative values of rising and falling producer prices which are computed using the Wolffram (1971) methodology as modified by Houck (1977).

A formal test that the price transmission mechanism is symmetric is given by:

$$\begin{aligned} H_N &: \sum_{i=0}^{n} \beta_{ji}^{+} = \sum_{i=0}^{n} \beta_{ji}^{-} \\ H_A &: \sum_{i=0}^{n} \beta_{ji}^{+} \neq \sum_{i=0}^{n} \beta_{ji}^{-} \end{aligned} \tag{12}$$

The null hypothesis in Equation (12) is a test of linear restrictions and a t-test is appropriate. To test whether a single- or a two-regime model fits the data better, a corrected log likelihood ratio test as suggested by Wolfe (1971) was used. Although it is not a formal specification test, the simple t-test on mixing-weight parameter (τ) can also be used to test the significance of two-regime model.

To match the theoretical model with the empirical observations, various statistical procedures are followed. First, a unit-root test was conducted to determine whether seasonal producer-retail prices are stationary at seasonal frequencies. Second, Akaike's Information Criterion (AIC) was used to determine the optimum lag length (Akaike, 1974). Third, the model was tested for causality between producer prices and retail prices as proposed by Geweke et al. (1975).

4. Data

The data used in this study was taken from the Iranian Statistics Center database and from the Central Bank covering period of 1995-2013. This data includes the seasonal amounts of the time series of variables of wages, the value of sugar beet and sugarcane, price of sugar beet and sugarcane, value of energy products, capital stock, output quantity, producer price index and consumer price index. The final output is sugar that is considered in monetary values. Sugar beet and sugarcane, measured by their monetary values are as intermediate inputs in production of output. Other intermediate inputs are wages, capital stock and energy products. Regarding the different type of energy including electricity, gas and oil products are aggregated using their cost. Capital stock captures the monetary value of facilities and capital goods used by sugar producing firms. Producer price index (PPI) includes the weighted average changes in price of manufacturing. Consumer price index is also known as CPI.

5. Results and Discussion

Considering the fact that the used data was in a time series, first, their statistical behavior in variables of stationary was evaluated by the use of unit root test. The stationary test of the variables was conducted under two assumptions of the existence of intercept, and the existence of intercept and trend. The achieved results from this test showed that the applied variables have stationary behavior. Also in another part of the study, was considered the causality relationship between retails price and the producer price and it was recognized that the direction of price transmission was from producer to the retail price. Because of this, in the achieved specifications, the variable of consumer price index is considered as a function of the producer price index. It has to be mentioned

that in analyzing the results, price index means sugar price index which is shortly referred to as price index or price.

In the Table 1, the results achieved from a two-regime specification have been presented. It has to be mentioned that the variables have been used in logarithmic form; because of this, they can be used as elasticity. The presented results show that the quantity of the statistic logarithm of the likelihood for the two-regime pattern is higher than the single regime pattern. The test of the difference between these two patterns according to the mentioned statistic also confirms the superiority of two-regime pattern. Of course, comparing the findings of the two patterns also clearly shows the superiority of the two-regime pattern. The quantity of the statistic τ showed that the probability of appearance of the first regime is 30% and the second regime with a probability of 70% will appear. Therefore, more concentration could be made in the second regime.

In the first regime, except for the decreasing amounts or series of producer that have negative effects on the retail prices, of course, this is also compatible with the principles and theory of price transmission, other variables have positive effects on retails price of sugar. Also, the series of price increases in the producer level get transmitted to retails level with a higher coefficient and higher statistical significance compared to series of price decreases in the producer level. On the other hand, the lags of series of increases and decreases of producer price affect the price in the retails level with considerably less absolute coefficient compared to the current producer price. This is while except for the first lag in the price increases of the producer, other cases have not even statistically become significant. It means that in the first regime, price in the retails level is affected more than the prices of the current period.

About the affecting of the producer price index, it has to be mentioned that considering the existence of positive intercept which is statistically significant, there is always a difference between these two prices and, depending on the producer price index, this difference is inclined to increase. This inclination to increase can be a prerequisite of imposing the market power too. Of course for market power, clearly, the variable coefficient of inverse elasticity of product supply has been used. The coefficient of this variable shows the distance between the marginal cost and price. In the first regime, the coefficient amount of this variable is 66% and positive. Therefore, according to this finding, it can be said that in the first regime, the sugar producing units have market power and are able to increase the price of supplied product in the retails market beyond the increase in the marginal cost. The increase in the marginal cost of production leads to increase of price in the retail level. As it is observed, it is expected that in return for 1% increase in the marginal cost of production at the producer level, the retails price index increases 3.6%.

In the second regime, like the first regime, market power has a high statistical significance, but the variable coefficient of inverse elasticity of supply is less than that of the first regime and has a significant difference with its amount in the previous regime. In the second regime, the effect of marginal cost is positive like in the first regime, it has high statistical importance, and the absolute value of its coefficient is high, therefore, increase the marginal cost will have a positive and considerable effect on the price in the retail level. It was also clarified that price increase in producer leads to price increase in retails and this effect happens in the current period and one delay period. On the other hand, the effect of amounts or the decreasing series of producer price index also is transmitted during the current period and one delay period. In addition to that, it has a reverse effect, and in terms of coefficient absolute value and statistical significance, it has less effect compared to amounts or increasing series of the producer price. In the study of Acharya et al. (2010) also similar findings are observed.

Table 1. The achieved results from measuring the two-regime pattern of price transmission from the producer to the retails market in the sugar production industry

Variable	Regime 1		
	Coefficient	Standard deviation	Statistic Z
Intercept	9.8295***	1.7729	5.54
The increasing series of producer price	5.8962***	0.9517	6.19
The decreasing value of producer price	-2.5719*	1.5731	-1.63
Inverse elasticity of product supply	0.6607***	0.0811	8.14
Marginal cost	3.5564***	0.0906	39.23
The first lag of increasing series of producer price	1.4954**	0.6641	2.25
The first lag of the decreasing series of producer price	-0.9775	1.5751	-0.62
The second lag of increasing the series of producer price	0.4542	0.4626	o.98
The second lag of decreasing series of producer price	-1.5368	1.6502	-0.93

Table 1. Continued

Variable	Regime 2		
	Coefficient	Standard deviation	Statistic Z
Intercept	1.6394	1.0398	1.57
The increasing series of producer price	2.8601***	1.0632	2.68
The decreasing value of producer price	-1.8854*	1.0644	-1.77
Inverse elasticity of product supply	0.1033***	0.0342	3.01
Marginal cost	1.6681***	0.1118	14.91
The first lag of increasing series of producer price	5.4662***	1.4523	3.76
The first lag of the decreasing series of producer price	-1.7670*	1.0673	-1.65
The second lag of increasing the series of producer price	-2.1687	2.5754	-0.84
The second lag of decreasing series of producer price	-1.3857	1.1996	-1.15
Statistic	Log Likelihood	Q (1)	Q(2)
	143.54	12.71(0.001)	13.34(0.003)

Note. *, ** and *** are respectively significance in the levels 10%, 5% and 1%.

Source: Research findings.

In the Table 2 also the results of the integrative regime have been presented. According to the statistics of diagnosis, this specification compared to the previous specification has lower descriptiveness. In this way, the statistic of likelihood logarithm for this specification is meaningfully lower than the two-regime specification. In addition to that, it is observed that except for the variable of the marginal cost, other variables do not have a significant effect on retails price index. However, the considerable point is the existence of significance coefficient for marginal cost variable. It means that even by keeping in mind the one-regime pattern, the effect of the marginal cost is observable in the retail price level. The achieved coefficient for this variable in the one-regime pattern is approximately its average value in the two-regime pattern.

Table 2. The achieved results from measuring the one-regime pattern of price transmission from the producer market to the retails market in the sugar production industry

Variable	Coefficient	Standard deviation	Statistic t
Intercept	-1.1309	2.5631	-0.44
The increasing series of producer price	1.4704	2.3546	0.62
The decreasing value of producer price	1-.0144	3.0643	-0.33
Inverse elasticity of product supply	0.1027	0.0933	1.09
Marginal cost	2.6124***	0.2329	11.21
The first lag of increasing series of producer price	2.3785	2.6965	0.88
The first lag of the decreasing series of the producer price	-1.4675	3.0531	-0.48
The second lag of increasing the series of the producer price	4.9334	2.5141	1.96
The second lag of decreasing series of the producer price	-3.1471	3.3561	-0.93
Statistic R^2	Log Likelihood	Q(1)	Q(2)
	-52.88	63.65(0.001)	114.73(0.001)

Note. *, ** and *** are respectively significance in the levels 10%, 5% and 1%.

Source: Research findings.

In Table 3, the amounts of elasticity in the short-run and long-run and also their difference for every one of the decreasing and increasing series are presented. As it is observed, the integrative one-regime pattern in both long-run and short-run shows that the producer price does not have a significant effect on retails price; in other words, price changes are not transmitted from producer to retail. Of course, this does not mean that there is no relationship between these two series; because in the two-regime pattern this relationship is obvious.

The short-run coefficients compared to the long-run coefficients have higher absolute values and also long-run coefficients have positive effects. It means that by an increase of price in the long-run, in the producer level, the price in the retails level increases as well, and vice versa. About both regimes, in addition to the difference in the direction of affecting of the two increasing and decreasing series, according to the absolute value of the coefficient, the effect of increasing series is approximately two times more than the effect of decreasing series. Therefore, it is expected that the decreasing series have the reverse effect on the producer price index and after a decrease of the producer price, the price in retails level increases. This is while the increase in the producer price also shows a positive effect on the consumer (or retail) price index. In other words, in the short-run, in the second regime, the market elements have tendencies to maintain retails prices in high levels. Of course, in every two regimes, the coefficient difference of two increasing and decreasing series is statistically significant.

The amounts of short-run coefficients in both regimes compared to the equivalent long-run amounts show bigger values. It is so much that about the series of increasing the producer price, the amounts of the coefficients have increased more than 5 times, but about the decreasing series, in addition to the fact that its coefficient sign is positive, the coefficient amount also in the regime is more than triple, but in the second regime, the absolute value of long-run coefficient is approximately double more than its amount for the short-run coefficient. Also unlike in the short-run, in the long-run, in both regimes, the direction changes of the two price indexes of producer and retails are convergent , of course, the coefficient value of increasing series in the second regime has a negative sign but it has not become significant. The amounts of the statistic t also show that in both regimes, the efficiency of increasing series is significantly superior to the efficiency of the decreasing series and difference of coefficients has high statistical significance in the long-run.

About the low-value coefficient, it has to be explained that these values, in fact, show the amount of change in the slope of the related variable; whereas between price in the producer and retails, there is a significant distance as margin, and existence of significant coefficients that mostly have positive signs means that the market elements at the producer level are able to increase the distance or margin between producer price values and those of the retail by imposing the market power.

Table 3. Price transmission elasticity between producer and retail markets

		Integrative regime	First regime	Second regime
Short-run	Increasing series of the producer price	1.470	5.896***	2.860***
	Decreasing series of the producer price	-1.014	-2.571*	-1.885*
	Difference	2.484	8.460	4.745
	Statistic t	0.608	4.40	2.98
Long-run	Increasing series of the producer price	0.126	1.028***	-0.412
	Decreasing series of the producer price	1.168	0.885***	3.620***
	Difference	1.0418	0.1422	-4.033
	Statistic t	-1.446	0.288	-2.603

Note. *, ** and *** are respectively significance in the levels 10%, 5% and 1%.

Source: Research findings.

6. Conclusion and Suggestions

This study was carried out with the objective of analyzing price transmission between production market and retails market of sugar. In this analysis, clearly, some deductions were made for market power. Most studies, especially about sugar, have evaluated price transmission between domestic market and the global markets. One of these studies is Cilima (2006) according to whose findings, price change in the global markets has affected the sugar price in the domestic markets of Tanzania, and this price transmission between global and domestic markets was evaluated as asymmetry. Unlike the above-mentioned studies, in this study, the price transmission pattern was evaluated in two levels of the market, including the wholesale or producer level and the retail level. However, the most important distinct aspect of this study is preparing more tools for analyzing market power; because as Pultzman (2000) carried out a comprehensive study over 282 different products including 120 agricultural crops, he mentioned that monopoly and market power can be elements of asymmetric price transmission. In other words, if the asymmetric price transmission is approved, it can be regarded as a probability on the existence of market power. In addition to the tools of deducing from market power, in terms of the applied specification too, this study helps the existing literature. It is in this way that in this study, sugar's retails price behavior has been evaluated in the framework of two different regimes of changes. Different behavior is specifically compatible with the nature of supplying agricultural products that have wide supplies in the harvest seasons. However in terms of tools, in the applied pattern in this study, in addition to the fact that according to the price transmission pattern about market price it was deducted, another tool was using the inverse of elasticity supply. By the use of this tool, it was identified that significantly there is a distance between price and marginal cost and therefore it can be a reason for the existence of market power. Especially by relying on the more probable regime (second regime), it was clarified that the marketing elements at the producer level are inclined to transmission price increase to the retails level with higher intensity compared to the price decrease. Asymmetric price transmission and existence of market power were approved in conditions where it was clarified that determining the behavior of retails price of sugar is not the same in the whole period; and considering the inelastic supply of product in the short-run, it is required that change in the supply behavior should be considered as well. It seems that the first regime altogether according to both achieved deductions for market power-inverse elasticity coefficient of supply and the price transmission pattern- shows much more market power compared to the second regime. It also seems that the first regime has 30% more probability of happening which is most accordant with the seasons of affluent supply when considering the limitedness of production institutes, production, and processing of sugar which has high activity scale as well, imposes market power and creates a monopsony market. However, by getting away from the harvest season and by a decrease of product supply, their market power decreases. On the basis of this analysis, it is advised that by preparing the beds for the operation of small institutes in order to increase competition in the market, production, and processing of sugar is to be carried out.

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