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The Study of Transmission of Price from Farm to Retail Shops in Saffron Market (Case Study of Estahbanat)

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Abstract

The market margin presents the difference between the price offered by supplier and consumer and it is very important in supplying agricultural products especially when the effect of supplier offered price increase (reduction) is not symmetric on the price offered by the consumer. The main purpose of this research is to study the procedure of price transfer (symmetric or asymmetric) in saffron market of Estahbanat. The research data have obtained from monthly prices of saffron retail and wholesale during 2005-2010 by the agricultural Jihad organization. The price transfer test, Hook and asymmetric error modification models were used for determining saffron transfer price from wholesale to retail. The tractions obtained from hook method show the effect of price increase and decrease in farms price separately. If the time series variable is convergent but not static, (i.e. there is a balance and long-term relation between the variables), then the Hook method cannot be applied and instead error correction model should be used. In this condition, the acceptance of null hypothesis shows the price transfer symmetry, while non-acceptance shows the asymmetry in price transfer. The results suggest that although the price transfer from supplier to wholesale be asymmetric in short time, this is symmetric in long time. In addition, the price transfer from wholesale to retail is asymmetric in long term. There is a reasonable relation between the supplier price and wholesale price and vice versa.

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Therefore, establishing the supply cooperatives especially agricultural marketing once including farmers, wholesalers, and even dealers is recommended for solving these problems. This results in making closer the relation between the farmers and wholesalers and eliminating unnecessary dealers in one hand and more benefits of final price for the farmers.

Keywords: symmetry; asymmetry; price transfer; saffron; Iran.

1. Introduction

Considering that agricultural products have a major role in providing the food safety of society and raw materials of industries, they have constantly been in need of policymaker and state planners' support [12; 14; 15; 16]. One of the factors which influences producers, marketing agents, and consumers of a product' welfare is the interaction of the price of that particular product in one level of market relative to its price changes in other levels of market (manner of price transmission). For this reason, study of price transmission in the market of agricultural products has been the focus of many economists, and there have been many studies conducted on this subject. transmission of price in the market of a product is under the impact of the structure of the market, in a way that non-competitive structures and the use of market power influences the transmission of prices, producers, and consumers' welfare [10; 4]. Performance of price and market is under the influence of numerous factors and indicators, which the most important of all is the issue of symmetry of price transmission in different levels of market. Presence of symmetry in market is the sign of complete transmission of price changes in one level of market (increase or decrease) to the other levels. In an asymmetric transmission, the effect of price increase or decrease in a level is not completely transferred to other levels or it may cause the increase of price to happen faster and completely but the decrease of price to happen more slowly and incompletely, or vice versa. Asymmetric transmission of price will drive the profit of price increase to dealers and will increase the margin of market and the final price of a product [13; 11].

2. Types of asymmetric transmission

There are two types of asymmetric transmission (long-term and short-term). Short-term asymmetric transmission happens when the rate of immediate effect of price increase or decrease of the producer is not the same for the price of retail, but its long-term effect is the same. Long- term asymmetric transmission happens when an increase in the price of a producer in short time relative to price decrease in long time (after the complete period of adjustment), has a different effect [4]. Saffron as the most valuable agricultural and pharmaceutical product in the world has a unique place between industrial and exportable products in Iran. Currently Iran is the biggest producer and exporter of saffron in the world. Overall, Iran is responsible for more than 65% of world production of saffron. Agriculture section in Fars province, which possess a major share in national raw production, has one of the most important production, employment, and food safety roles, and Estahban, Bovanat, Abadeh, Safa Shahr, and Marvdasht are among major towns where produce saffron in Fars province. Estahban is the center of saffron production in Fars province where due to its perfect climate more than 80% of saffron of Fars province is produced there. Under cultivation area of saffron in Estahban is around 250-300 hectares. The present study is trying to determine the way of transmission of price from farm to retail shops in the saffron market of Fars province.

3. According to the mentioned points, the goals of this study are:

- Estimation of the price transmission pattern in saffron market.
- Study of price transmission elasticity in different levels of market.
- Determination of the price causative relation in two levels of wholesale and retail in the market of the product.

4. Assumptions of this study are that price transmission from farm to retail is as the followings

Price fluctuations in wholesale level are symmetrically transferred to retail level. Increase of the price in wholesale is transferred completely to retail. Price decrease transmission to retail does not happen completely.

5. A review on the conducted studies

Table 8

Writer	Subject	Model	Description
Moghaddasi and Ardekani (2007)	Study of the way of price transmission in the market of egg and chicken in Iran	Hook and error correction model	Price fluctuations in wholesale level are transferred symmetrically to retail level
Torkamani (1999)	Study of technical performance of saffron planters and marketing margin	Using stochastic frontier function and the price difference between retail and farm method	Using some of production institutions in saffron planting is not in the optimized range
Faraj Zadeh and Esmaeeli (2010)	Study of price transmission in the world market of pistachio	Using input stipulate model and error correction pattern	Results suggest the long-term symmetric price transmission pattern in both domestic and world pistachio market and also short-term asymmetric transmission was evaluated
Taheri (2008)	Study of market structure and price transmission of corn	Focus indicators	Price transmission from the world market to the domestic market in long time is symmetric but in a short time is asymmetric

6. Data and statistics sources

Used data in estimation are in the form of time series and contain producer, wholesale, and retail's monthly prices of saffron during 2005 to 2010, which have been obtained from Agricultural Jihad organization of Fars province. All the estimation steps and conduction of the related tests have been done by EVIEWS5, and MICROFIT4.1 software packages, and to conduct different levels, MICROSOFT EXCEL software has been used.

7. Method

To study the way of price transmission we have used unit root, to test the presence of long-term balancing relation we have used the convergence technique of Johansen-Juselius, two-step method of Engle-Granger has been used to determine causality direction, and the error correction model of Engle-Granger (ECM-EG) and hook model have been used in studying the symmetry in the saffron market.

Hook model:

$$Pr_t - Pr_0 = \alpha_0 t + \alpha_1 \sum_{i=0}^{M_i} \Delta P\, f_{t-i}^{+} + \alpha_2 \sum_{i=0}^{M_2} \Delta P\, f_{t-i}^{-} + e_1 \quad (1)$$

In which Pr is the logarithm of retail price, Pf is the logarithm of farm price, ΔPf^{+} is the increase in farm prices, and ΔPf- is the decrease in farm prices, and M_2, M1 are the duration of interval.

Engle-Granger causality test:

$$\Delta LP_R = \mu_1 + \sum \alpha P_R \Delta LP_R + \sum \alpha P_w \Delta LP_w - \pi_1 L_{1t-1} + e_{1t} \quad (2)$$

$$\Delta LP_w = \mu_2 + \sum \beta P_R \Delta LP_R + \sum \beta P_w \Delta LP_w - \pi_2 L_{2t-1} + e_{2t}$$

In which n_1 , n_2 are the duration of intervals, P_R and Pw are retail prices index and wholesale prices index in the cycle of t respectively, Z_{1t} □1 □ P_R □□0 □□1P_w and Z_{2t} □1 □ P_w □□0 □□1P_R are the error correction interval components.

Engle-Granger error correction model (ECM-EG):

This model is formed based on Hawk model (1977) which its first form is brought in equation number 3;

$$\Delta LP_{w1} = \mu + \sum \alpha P_p - \Delta LP_R + \sum \alpha P_p + \Delta LP_R + \varepsilon_t \quad (3)$$

In which $\square_{PP}^{\square}$ shows the producer's price decrease effect and $\square_{PP}^{\square}$ shows the producer's price increase effect on the consumer's price. If P_R *and* P_w are convergent, then the equation 4 will be

like the following:

$$\Delta LP_w = \mu_1 + \sum \alpha P_R \Delta LP_R + \pi_1 Z_{t-1} + \sum \alpha P_R \Delta LP_w + \sum \alpha P\_R \, \Delta LP\_w + \varepsilon_t \qquad (4)$$

In this equation, $Z_{t \square 1}$ $\square$ P_w $\square \square_0 P_R$ which is derived from the convergent relation of P_R *and* P_w .

Granger (1989) has shown the equation number 5 as the following by the division of the error correction component into two positive and negative components:

$$\Delta LP_w = \mu_1 + \sum \alpha P_R \Delta LP_R + \pi_1 Z_{t-1} + \pi_1 - Z_{t-1}$$
$$+ \sum \alpha P_R \Delta LP_w + \sum \alpha PR \, \Delta LPw + \sum \alpha PP \, \Delta LPR + \varepsilon_t \qquad (5)$$

8. Conclusion and Discussion

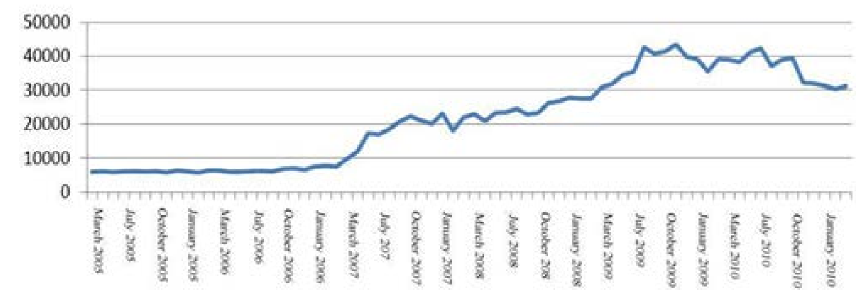

Figure 1: saffron wholesale monthly prices during 2005 to 2010

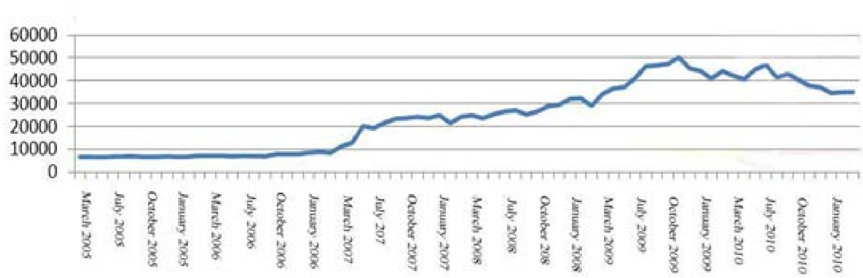

Figure 2: saffron retail monthly prices during 2005 to 2010

Table 1: Unit root test to determine the stagnation of saffron price variable

Price	y-intercept position	Meaningful level	Critical values	Static in level data	Static in first order difference
Producer	y-intercept with trend	1	-4.09	-1.49	-6.28^{***}
		5	-3.47		
		10	-3.16		
Wholesale	y-intercept with trend	1	-4.09	-0.51	-8.36^{***}
		5	-3.47		
		10	-3.16		
Retail	y-intercept with trend	1	-4.09	0.67	-8.58^{***}
		5	-3.47		
		10	-3.16		
Producer	y-intercept with trend	1	-4.09	-1.14	-6.29^{***}
		5	-3.47		
		10	-3.16		
Wholesale	y-intercept with trend	1	-3.52	-1.6	-8.28^{***}
		5	-2.4		
		10	-2.59		
Retail	y-intercept and trend	1	-3.52	-1.4	-8.79^{***}
		5	-2.4		
		10	-2.59		
Producer	Without y-intercept and trend	1	-3.52	0.47	-6.32^{***}
		5	-2.4		
		10	-2.59		
Wholesale	Without y-intercept and trend	1	-3.52	+2.14	-4.15^{***}
		5	-2.4		
		10	-2.59		
Retail	Without y-intercept and trend	1	-3.52	+1.96	-2.8^{***}
		5	-2.4		
		10	-2.59		

Figures 1 and 2 respectively show the trend of retail and wholesale monthly prices index of saffron in Fars province during the years 2005 t0 2010. As it is shown, retail and wholesale prices index of saffron until late 2006 had almost had an invariant trend, but since 2007, saffron price in two levels of retail and wholesale has had an ascending trend, and since March 2010 price trends have been descending.

9. The results of determining the optimal interval

Table (1-2): The results of determining the optimal interval for Johansen method (Producer to wholesale)

Interval duration	HQ	SBC	AIC
0	-1.37	-1.33	-1.40
1	-6.33	-6.21	-6.41
2	-6.46	-6.26	-6.59
3	-6.30	-6.02	-6.49
4	-6.25	-5.89	-6.49
5	-6.25	-5.81	-6.54

Table (2-2): The results of determining the optimal interval for Johansen method (Wholesale to retail)

Interval duration	HQ	SBC	AIC
0	-5.127416	-5.087646	-5.153458
1	-9.169635	-9.050326	-9.247761
2	-9.010738	-8.811889	-9.140947
3	-9.008378	-8.729989	-9.190671
4	-8.989754	-8.621825	-9.224131
5	-8.846731	-8.909263	-9.133191

Table (3-1): The results of statistics of maximum specific amount and effect in Johansen method (Producer to wholesale)

			Condition (b)		**Condition (c)**		**Condition (d)**	
Hypothesis Ziro		**Interaction Hypothesis**	**Calculated amount**	**Critical amount**	**Calculated amount**	**Effect amount**	**Calculated amount**	**Effect amount**
Effect test	R=0	R>1	23.23	20.26	19.76	15.49	33.79	25.87
	R>1	R>2	4.64	9.16	1.53	3.84	2.82	12.51
Maximum specific amount test	R=0	R=1	18.58	15.89	18.23	14.26	30.96	19.38
	R>1	R=2	4.64	9.16	1.53	3.84	2.82	12.51

To utilize Johansen technique, we need to calculate the number of intervals of endogenous variables in the model. According to the results of table (1-2), all the Akaike criterions (AIC), Schwartz Bayesian (SBC) and Hanan Queen (HQ) suggest that the optimal interval equal to 2, so to utilize Johansen method the optimal interval is considered 2 and as we can see, in table (2-2), all the three criterions suggest the optimal interval equal to 1.

Table (3-2): The results of statistics of maximum specific amount and effect in Johansen method (Wholesale to retail)

			Condition (b)		**Condition (c)**		**Condition (d)**	
Hypothesis Zero		**Interaction Hypothesis**	**Calculated amount**	**Critical amount**	**Calculated amount**	**Effect amount**	**Calculated amount**	**Effect amount**
Effect test	R=0	R>1	39.55**	20.26182	34.94***	15.494	3.10**	25.872
	R>1	R>2	5.96	9.164546	1.470	3.841	1.473	12.517
Maximum specific amount test	R=0	R=1	33.58***	15.892	33.47***	14.264	33.62**	19.387
	R>1	R=2	5.96	9.164	1.470	3.841	1.473	12.517

Table (4-1): The results of causality test of two-step Granger model Producer to wholesale)

Dependent variable	Short term causality test		Long term causality	
	αp_p	αp_w	z_{t-1}	z_{2t-11}
ΔLp_w	0.145		0.155***	
ΔLp_p		-0.40		0.539***

Table (4-2): The results of causality test of two-step Granger model (Wholesale to retail)

Dependent variable	Short term causality test		Long term causality	
	αp_p	αp_w	z_{t-1}	z_{2t-11}
ΔLp_w	-0.106		-0.38	
ΔLp_p		0.152		0.78*

10. The results of the number of optimal interval

Table (5-1): The number of optimal interval (Price transmission from producer to wholesale)

Interval duration	Akaike statistics	Schwartz statistics
0	-22.63*	-22.47*
1	-22.56	-22.34
2	-22.50	-22.21
3	-22.43	-22.07
4	-22.38	-21.95

Table (5-2): The number of optimal interval (Price transmission from wholesale to retail)

Interval duration	Akaike statistics	Schwartz statistics
0	-5.79*	-5.66*
1	-5.74	-5.51
2	-5.77	-5.48
3	-5.73	-5.38
4	-5.71	-5.28

Table (6-1): The results of symmetry in price test using ECM-EG (Producer to wholesale)

Variable	Elasticity	Criterion error	Statistic t
y-intercept	$-5.18*10^{-7}$	$6.10*10^{-7}$	-0.8488
Producer's price decrease series	1.05***	$1.38*10^{-5}$	722.14
Producer's price increase series	0.99***	$6.78*10^{-6}$	145.03
Negative interval amounts part of disruption of long-term equilibrium relation	$-4.39*10^{-5}$	$5.47*10^{-5}$	-0.801
Non-negative interval amounts part of disruption of long-term relation	$4.66*10^{-5}$	$5.47*10^{-5}$	0.852

Table (6-2): The results of symmetry in price test using ECM-EG (Wholesale to retail)

Variable	Elasticity	Criterion error	Statistic t
y-intercept	-0.003	0.003	-1.27
Producer's price decrease series	+0.719***	0.093	7.70
Producer's price increase series	+0.983***	0.054	18.00
Negative interval amounts except disruption of long term equilibrium relation	-1.05***	0.236	-4.43
Non-negative interval amounts except disruption of long term relation	-0.85***	0.234	-3.64

Table (7-1): The results of the symmetry of price transmission study (Producer to holesale)

	Wald test	Rejection or acceptance of hypothesis zero
Short-term symmetry	$1.48*10^{+10}$***	Assumption rejected (asymmetric)
Long-term symmetry	0.43	Assumption not rejected (symmetric)

Table (7-2): The results of the symmetry of price transmission study (Wholesale to retail)

	Wald test	Rejection or acceptance of hypothesis zero
Short-term symmetry	4.5***	Assumption rejected (asymmetric)
Long-term symmetry	0.23	Assumption not rejected (symmetric)

The results of the table (7-1) show that hypothesis zero based on producer and wholesale's price symmetry is rejected, since the Wald test calculated statistic ($1.48*10^{+10***}$) is meaningful.

However according to Wald test statistic not being meaningful in a long time (0.43), we cannot reject the hypothesis zero based on symmetry in price transmission. Based on this fact, however the price transmission in a short time from the producer to wholesale is asymmetric, in a long time the price transmission from the producer's level to wholesale's level is symmetric. The results of the table (7-2) show that hypothesis zero based on wholesale and retail's price symmetry in a short time is rejected, since the Wald test calculated statistic (4.5) is meaningful. However according to Wald test statistic not being meaningful in a long time (0.23), we cannot reject the hypothesis zero based on symmetry in price transmission. Based on this fact, however the price transmission in a short time from the wholesale to retail is asymmetric; in a long time the price transmission from the wholesale's level to retail's level is symmetric.

11. Conclusion

The study's findings show that the price transmission from the producer's market to retail's market is in the form of producer $\Longrightarrow$ wholesale $\Longrightarrow$ retail. In other words, any policy, which cause changes in the producer's prices will have an effect on the retail's market prices as well. In addition, policies, which influence the saffron market in wholesale, will be transmitted to the retail market as well. According to this part of the study's findings, it is suggested that it is important to always pay attention to the probable effects of implementing policies in producer's market on the both wholesale and retail's market as well.

The findings showed that price transmission from producer to wholesale are asymmetric in a short time and price decrease is transferred to the wholesale' market more completely. In other words, wholesalers have more powers against producers and it can be said that wholesalers' community has a more organized society compared to producer's community, so based on this fact it is suggested to pay more attention to products supply among producer's community via cooperatives consisted of producers.

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