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Price Transmission Analysis in Iran Chicken Market

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Abstract

Over the past three decades vertical price transmission analysis has been the subject of considerable attention in applied agricultural economics. It has been argued that the existence of asymmetric price transmission generates rents for marketing and processing agents. Retail prices allegedly move faster upwards than downwards in response to farm level price movements. This is an important issue for many agricultural markets, including the Iranian chicken market. Chicken is an important source of nutrition in Iranian society and many rural households depend on this commodity market as a source of income. The purpose of this paper is to analyze the extent, if any, of asymmetric price transmission in Iran chicken market using the Houck, Error Correction and Threshold models. The analysis is based on weekly chicken price data at farm and retail levels over the period October 2002 to March 2006. The results of tests on all three models show that price transmission in Iranian chicken market is long-run symmetric, but short-run asymmetric. Increases in the farm price transmit immediately to the retail level, while decreases in farm price transmit relatively more slowly to the retail level. We conjecture the asymmetric price transmission in this market is the result of high inflation rates that lead the consumers to expect continual price increases and a different adjustment costs in the upwards direction compared to the downwards direction for the marketing agents and a non-competitive slaughtering industry and that looking for ways to make this sector of the chicken supply chain more competitive will foster greater price transmission symmetry and lead to welfare gains for both consumers and agricultural producers.

Keywords:
Asymmetric Price Transmission, Iran Chicken Market, Houck Model, Error Correction Model, Threshold Model

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INTRODUCTION

Over the past three decades, vertical price transmission analysis has been the subject of considerable attention in applied agricultural economics (Meyer and Von Cramon-Taubadel, 2004 and Goodwin, 2005). It has been argued that the existence of asymmetric price transmission may generate rents for marketing and processing agents as retail prices move faster upwards than downwards in response to farm level price movements. This paper details our study of the price transmission process for the Iranian chicken where this issue has important economic welfare and political implications.

Chicken meat is an important commodity in Iran's economy. Chicken provides 50 percent of per capita meat consumption and is appreciated by Iranian consumers as a cheap source of protein in comparison with beef and lamb. Chicken is used by all income classes and its consumption has grown more than 250 percent since the 1979 revolution. Per capita chicken consumption in Iran is currently around 16.9 kg/year.

The size of the Iranian chicken market is about 1.2 million metric tons. There are more than 15,000 active producers producing 900 million live birds per year for this market. 89 percent of the farms are private farms, 8 percent of them belong to the cooperatives and 3 percent of them belong to the government. There are also 177 chicken slaughterhouses with a total annual slaughter capacity of 912 million live chickens. 76 percent of slaughterhouses are private firms, 10 percent of them belong to the government and 14 percent of them belong to the cooperatives. 67 percent of chicken production takes place in 10 provinces of Iran. In the other hand, 100 slaughter-houses with 66 percent of slaughtering capacity are located in 8 provinces; Tehran, Isfahan, Khorasan, Fars, Eastern Azarbaijan, Western Azarbaijan, Ardebil and Yazd. However, only 47 percent of the capacity of chicken production is in these provinces. Thus not only the number of slaughter-houses is less than the number of farms but also there is not a balance between production capacity and process capacity in different regions of the country. Because of this imbalance, some producers transport their live chicken for slaughtering to the regions that have excess capacity, for example from Mazandaran, Zanjan, Ghazvin and Qom to Tehran. On the other hand, wholesalers and middlemen transport chicken meat to the regions those have excess demand. In Iranian chicken market there are 515 wholesalers and 49000 retailers. There are not accurate statistics about the ownership of the wholesale and retail firms but our field operations in Tehran province showed that almost all of the wholesale firms belong to the owners of the slaughter-houses.

In May 2003, the Iranian Government introduced a price stabilization scheme for chicken. Under this scheme a ceiling and floor price are determined administratively every 2 to 4 months based on cost of production (including an 8% profit margin for producers). When market price falls below the floor, the government pays for the live purchase, slaughter, freezing and storage of chicken in an attempt to lift market price to at least the floor level. The buffer stock operations are carried out by a public-private organization which stores the chicken in one of its many of storage facilities maintained throughout the country. When the price moves above the ceiling, the public-private organization releases frozen chicken onto the market in an attempt to bring the market price down to at least the ceiling level. This policy is potentially a significant factor affecting price transmission and hence needs to be considered in any analysis of the asymmetry of price transmission.

The principal objective of this paper is to estimate farm-to-retail price transmission elasticities in the Iranian chicken market and to explore the existence of asymmetric price transmission. A number of alternative methods have been proposed for analyzing the existence of asymmetric price transmission. And, according to Meyer and Von Cramon-Taubadel (2004), different methods may lead to different conclusions. Thus we propose to explore three alternative methods, including the Houck approach, the Error Correction model and the Threshold model. In our analysis we employ weekly data over the period October 2002 to March 2006 pertaining to farm and retail prices of chicken from Iran.

MATERIALS AND METHODS

In this Section, three alternative models for analyzing asymmetric price transmission are discussed.

1. Houck Model

Wolffram (1971) was the first to propose a variable-splitting technique in the first differences of prices to estimate the asymmetry in price transmission. Houck (1977) proposed a modification to exclude the initial observations because, when considering differential effects, the level of the first observation will have no independent explanatory power. Further modifications to this approach were introduced by Ward (1982) to include lagged exogenous variables and by Boyd and Brorsen (1988) who also used lags to differentiate between the magnitude and the speed of transmission. The modified Houck Approach has been widely used (e.g. Kinnucan and Forker, 1987; Bailey and Brorsen, 1989; Hahn, 1990; Mohanty *et al.*, 1995; Aguiar and Santana, 2002; Capps and Sherwell, 2005). Equation (1) shows the modified Houck model for the Iranian chicken market:

$$\Delta RP_t = \alpha_0 + \sum_{i=0}^{L1} \alpha_{1,i} \Delta FP^+_{t-i} + \sum_{i=0}^{L2} \alpha_{2,i} \Delta FP^-_{t-i} + \alpha_3 D_{2003} + \varepsilon_t \quad (1)$$

where:

$\Delta RP_t = RP_t - RP_{t-1}$ is the observation-to-observation difference of chicken meat price at the retail level;

ΔFP^+_{t-1} and ΔFP^-_{t-1} are the increases and decreases of the live chicken price at the farm respectively;

D_{2003} is a dummy variable for the Government's market adjustment policy. It equals 0 for observations prior to the introduction of the policy on May 9, 2003 and 1 thereafter.

α_0, $\alpha_{1,i}$, $\alpha_{2,i}$ and α_3 are the coefficients to be estimated. The $\alpha_{1,i}$ coefficients represent the impact of farm price increases on retail price and the $\alpha_{2,i}$ coefficients represent the impact of farm price decreases on retail price;

L_1 and L_2 are the maximum lag lengths for farm price increases and decreases respectively; and

ε_t is the random error term.

After estimating equation (1), two tests may be performed for the existence of price transmission asymmetry. They are tests with respect to the magnitude and speed of price transmission. The magnitude test for asymmetric price transmission can be represented by the null hypothesis H_0 in equation (2) below.

$$H_0: \sum_{i=0}^{L1} \alpha_{1,i} = \sum_{i=0}^{L2} \alpha_{2,i} \quad (2)$$

A rejection of H_0 is evidence for asymmetry in the magnitude of price transmission.

The speed test for asymmetric price transmission can be represented by the null hypothesis H_0 in equation (3):

$$H_0: \alpha_{1,1} = \alpha_{2,1}, \alpha_{1,2} = \alpha_{2,2}, \ldots, \alpha_{1,L1} = \alpha_{2,L2} \quad (3)$$

A rejection of H_0 is evidence for asymmetry in the speed of price transmission.

2. Error-Correction Model

Von Cramon-Taubadel and Loy (1996) proposed testing for asymmetric price transmission between co-integrated price series by using an Error Correction Model (ECM) extended by incorporating asymmetric adjustment terms. Scholnick (1996), Bornstein *et al.,* (1997) and Capps and Sherwell (2005) have each used this approach to test asymmetric price transmission.

To use this approach, we first estimate the co-integration relationship represented in equation (4):

$$RP_t = \lambda_0 + \lambda_1 FP_t + \lambda_2 D_{2003} + e_{RF,T} \quad (4)$$

Here RP_t is the retail price of chicken meat, RP_t is the farm price of live chicken and D_{2003} is a dummy variable for the Government's market adjustment policy (equals 1 after the introduction of the policy on May 9, 2003 and 0 otherwise). After estimating (4), the lagged co-integrating residuals $e_{RF,T-1}$ are split into positive and negative phases used in estimating the ECM for the Iranian chicken market:

$$\Delta RP_t = \alpha_0 + \sum_{i=0}^{L1} \alpha_{1,i} \Delta FP^+_{t-i} + \sum_{i=0}^{L2} \alpha_{2,i} \Delta FP^-_{t-i} + \alpha_3 D_{2003} + \varphi^+ e^+_{RF,T-1} + \varphi^- e^-_{RF,T-1} + \varepsilon_t \quad (5)$$

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where:

ΔFP^{+}_{t-1} and ΔFP^{-}_{t-1} are the farm price increases and decreases respectively;

$e^{+}_{RF,T-1}$ and $e^{-}_{RF,T-1}$ are the positive and negative observations of lagged co-integrating residuals respectively;

β_0, $\beta_{1,i}$, $\beta_{2,i}$, β_3, φ^{+} and φ^{-} are the coefficients to be estimated.

In this paper, we will use the ECM to test only for asymmetry in the speed of price transmission and not in its magnitude. This follows Meyer and von Cramon-Taubadel (2004) who point out that co-integration and ECM are based on the idea of prices being in long-run equilibrium. In fact, prices may drift apart in the long run for reasons unrelated to pure price transmission (e.g. the inclusion of new marketing services), thus it is impossible to test asymmetry in the magnitude of price transmission.

The ECM test for short-run asymmetric speed of price transmission can be represented by equation (3), the same H_0 as for the Houck model. The ECM test for long-run asymmetric speed of price transmission can be represented by the H_0 in equation (6):

$$H_0: \varphi^{+} = \varphi^{-} \qquad (6)$$

A comparison between equations (1) and (5) shows that the ECM nests the Houck model. Capps and Sherwell (2005) argue that if either of the coefficients φ^{+} and φ^{-} are statistically different from zero, the ECM is statistically superior to the Houck model.

3. Threshold Model

Tong (1983) introduced the concept of nonlinear threshold models. In this approach, deviations from the long-run equilibrium between co-integrated price series will only lead to price responses if these deviations exceed a specific threshold level. Meyer (2003) argues that if an ECM is used to estimate price adjustment, there is an implicit assumption that price adjustments induced by deviations from the long-run equilibrium are continuous and a linear function of the magnitude of the deviations from long-run equilibrium. So, even very small deviations from the long-run equilibrium will lead to an adjustment process on each market, and this is considered unlikely if adjustment costs are present. Threshold models have been used in a number of studies (e.g. Goodwin and Harper, 2000; Serra and Goodwin, 2003; Varra and Goodwin, 2005; Serra *et al.*, 2006; Balcombe *et al.*, 2007). The equations in (7) show a multiple threshold ECM for the Iranian chicken market:

$$\Delta RP_t = \alpha_0^1 + \sum_{i=0}^{L1} \alpha_{1,i}^1 \Delta FP_{t-i} + \alpha_2^1 D_{2003} + \varphi^1 e_{RF,t-1} + \varepsilon_t$$

$$if\ e_{RF,T-1} < C_1$$

$$\Delta RP_t = \alpha_0^2 + \sum_{i=0}^{L1} \alpha_{1,i}^2 \Delta FP_{t-i} + \alpha_2^2 D_{2003} + \varphi^2 e_{RF,t-1} + \varepsilon_t$$

$$if\ C_1 \le e_{RF,T-1} \le C_2$$

$$\Delta RP_t = \alpha_0^3 + \sum_{i=0}^{L1} \alpha_{1,i}^3 \Delta FP_{t-i} + \alpha_2^3 D_{2003} + \varphi^3 e_{RF,t-1} + \varepsilon_t$$

$$if\ C_2 < e_{RF,T-1} \qquad (7)$$

Following Varra and Goodwin (2005) we will use this model to test the following asymmetries in price transmission:

Asymmetry in the speed of price transmission outside the (C_1, C_2) interval;

Asymmetry in the magnitudes before a response is triggered (C_1 and C_2 differ in absolute value)

The estimation procedure for the threshold model used follows Varra and Goodwin (2005) and may be summarized in the following steps.

1- Augmented Dickey-Fuller unit root test and Johansen co-integration test are used to evaluate the time series properties of the data.

2- A co-integrating relationship among the variables is estimated by OLS and the lagged residuals from the co-integrating regression are obtained as the error correction term.

3- A two-dimensional grid search is then conducted to define two thresholds. The procedure searches for the first threshold between 1% and 99% of the largest (in absolute value) negative error correction term. In like fashion, it searches for the second threshold between 1% and 99% of the largest positive error correction term. To choose the thresholds, it needs to search for the minimum of the log of the determinant of the covariance matrix for the residuals. When the optimal threshold is determined, the equations in (7) will be estimated using the threshold values.

RESULTS

The data used in this study are average weekly prices for live chicken (the farm level) and chicken meat (the retail level) over all provinces in Iran for the period October 2002-March 2006. Figure 1 shows the behavior of weekly farm and retail chicken prices in Rials/kg. As may be seen, farm and retail prices have a similar pattern of fluctuations. However, over the period in question, the prices have drifted slightly apart with the farm price rising 17 percent and the retail price rising 19 percent. This resulted in a growth in marketing margin of 22.5 percent over this same period. The reports of the central bank of Iran show that the inflation rates have been 12-15 percent during 2002-2006.

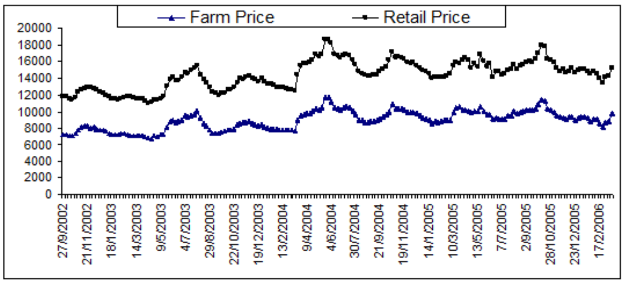

Figure 1: Weekly farm and retail chicken prices (October 2002-March 2006)
Source of data: Iranian Ministry of Agriculture

Our procedure for testing for asymmetric price transmission involved two preliminary steps:

1- Test for the presence of unit roots in the two price series. This will determine whether the price series need to be first differenced in the estimating equation for price transmission equation;

2- Test for Granger causality of the two price series. This will determine which of the two price series to use as the dependent variable in the estimated price transmission equation.

The basic test for unit roots is the Augmented Dickey-Fuller (ADF) test. The results of the ADF test for both the farm price series and the retail price series are summarized in Table 1. We failed to reject the null hypothesis for a single unit root at both the farm and retail levels and hence conclude the price series are co-integrated. One problem with the standard ADF test is

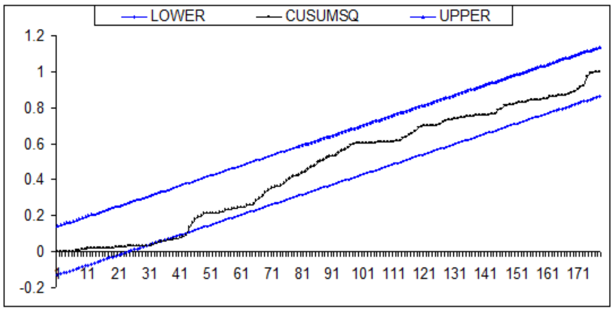

Figure 2: CUSUMQ test for farm and retail prices of chicken

that the test results may be invalidated by the presence of structural breaks in the data series. However, the government's introduction of the price stabilization scheme in May 2003, may have caused exactly that. Hence a CUSUMQ test was used to check for structural breaks in our data. The results of this test are represented in Figure 2 where a structural break is revealed in the 32nd week of the time series, the same time as the government policy intervention.

Table 1: ADF Test for Farm and Retail Chicken Prices

Null Hypothesis	Farm Price		Retail Price	
	Test Statistic	Critical Value*	Test Statistic	Critical Value*
No Trend	-1.83	-2.57	-1.73	-2.57
No Trend, No Constant	1.98	3.78	1.86	3.78
No Trend	-2.58	-3.13	-2.29	-3.13
No Trend, No Constant and Unit Root	2.51	4.03	2.01	4.03
No Trend and Unit Root	3.45	5.34	2.78	5.34

* at the 10 percent significance level

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As a result, we applied a modified ADF test proposed by Perron (1990) to test for non-stationarity (a unit root) in the presence of a structural break. We estimated equation (8):

$$Y_t = a_0 + a_1 DU + dDTB + \beta t + \rho Y_{t-1} + \sum_{i=1}^{p} \theta_i \Delta Y_{t-i} + e_t \quad (8)$$

Where:

Y_t is the times series being tested for non-stationarity;

DU is a dummy variable equal to 1 for observations after the structural break (32nd observation), 0 otherwise;

DTB is a dummy variable equal to 1 for the 33rd observation, 0 otherwise;

With respect to the estimated equation (8), the null hypothesis of the test for the presence of a unit root in Y_t is:

$$H_0: \rho = 1 \quad (9)$$

where, Perron (1990) has calculated appropriate critical values. The corresponding test statistics for the farm price series and retail price series are -4.17 and -4.04 respectively and the appropriate critical value -4.39 at 1 percent of significance. We thus conclude there is insufficient evidence to reject H_0. The results of the ADF test in the presence of a structural change confirm the results of the standard ADF test.

We then tested for Granger causality between the two price series. Testing that farm price Granger causes retail price yields a highly significant test statistic of 9.1 at 1 percent of significance. However, the converse test that retail price Granger causes farm price yields the insignificant test statistic of 0.22. Thus we set ΔRP as the dependent variable in the price transmission models.

We now turn to test for asymmetric price transmission using the three alternative approaches to estimation: the Houck Model; the Error-Correction Model; and the Threshold Model.

1. The Houck Model

The farm price was first segmented following the Houck procedure. Equation (1) was then estimated using the OLS method. The Ramsey test statistic (F=1.09) suggested that misspecification was not a problem and the Jarque-Bera statistic (9.92) suggested that the residuals are normally distributed. However, the Durbin-Watson (DW) test on this equation suggested the presence of serial correlation. Thus, the equation was re-estimated using the GLS method and the results of this estimation are summarized in Table 2. We used the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) to determine the optimal lag length of farm

Table 2: Houck Model of Farm to Retail Price Transmission

Dependent Variable: ΔRP_t (First Difference of Retail Price) (GLS method)				
Name of Variable	**Estimated Coefficient**	**t statistic**	**Short-Run Elasticity**	**Long-Run Elasticity**
Intercept	-0.28	-0.17	-	-
ΔFP^-_t (Farm Price Decreases)	0.96	9.7*	0.33	
ΔFP^-_{t-1} (1st Lag of Farm Price Decreases)	0.26	3.58*	0.09	0.42
ΔFP^+_t (Farm Price Increases)	1.32	18.2*	0.52	0.52
D_{2003} (Government Policy)	0.45	0.3	-	
R2		0.83	AIC	5.11
D.W		2.13	SIC	5.21
Price transmission tests		F statistic	Result	
Symmetry in Speed of Price Transmission		6.01	Reject	
Symmetry in Magnitude of Price Transmission		0.46	Accept	

*Significant at 1%

Table 3: Error Correction Model of Farm to Retail Price Transmission

Dependent Variable: ΔRP_t (First Difference of Retail Price) (GLS method)				
Name of Variable	**Estimated Coefficient**	**t statistic**	**Short-Run Elasticity**	**Long-Run Elasticity**
Intercept	-1.18	-0.68	-	-
ΔFP^-_t **(Farm Price Decreases)**	0.93	9.96*	0.32	0.36
ΔFP^-_{t-1} **(1st Lag of Farm Price Decreases)**	0.11	1.54**	0.04	
ΔFP^+_t **(Farm Price Increases)**	1.29	18.63*	0.51	0.51
D_{2003} **(Government Policy)**	0.16	0.11	-	-
$e^+_{RF, T-1}$ **(Positive Values of Lag Error Term)**	-0.29	-3.24*	-	-
$e^-_{RF, T-1}$ **(Negative Values of Lag Error Term)**	-0.22	-2.91*	-	-
			AIC	4.96
R2		0.86		
D.W		2.04	SIC	5.09
Price transmission tests		F statistic	Result	
Symmetry in Speed of Price Transmission		7.04	Reject	
Symmetry in Price Transmission in Long-Run		0.28	Accept	

*Significant at 1%

price increases and decreases. These two criteria showed that only the first lag of farm price decreases has a significant effect on retail price differences. The high R^2 together with the statistical significance of the estimated regression coefficients confirm the goodness of fit of the model. The small t statistic on the D_{2003} suggests that the government's introduction of the price stabilization policy has not had any significant effect on retail price fluctuations. We estimated Houck Model including Product Dummy variable too but the results showed that the coefficient of this variable is not significant.

A comparison between the coefficients of farm price increases and farm price decreases indicates that retail price is more sensitive to increases than decreases in farm prices. Price transmission elasticities and price transmission tests also confirm that price transmission in the Iranian chicken market is asymmetric and farm price increases transmit more fully and faster than farm price decreases to the retail price.

2. Error Correction Model (ECM)

The ECM as represented by Equation 5 was first estimated using the OLS method. As with the Houck Model, the Ramsey test statistic (F=2.3) suggested no evidence of misspecification and the Jarque-Bera statistic (12.68) suggested that the residuals were normally distributed. However, once again the Durbin-Watson test confirmed the presence of serial correlation. Hence the ECM was re-estimated using the GLS method and the results are summarized in Table 3. The high R^2 together with the statistical significance of the estimated regression coefficients confirm the goodness of fit of the model. As expected the coefficients of farm price increases and decreases have positive sign indicating a positive relationship between farm and retail prices. Further, as expected, the coefficients of the positive and negative values of the lag of error correction term have a negative sign indicating that any deviation from long-run equilibrium between farm price and retail price in one period will tend to be compensated for in the next.

As in the estimated Houck model, the AIC and SIC confirm the statistical significance of a first lag of farm price decreases. The coefficients and corresponding elasticities of ΔFP^{-}_{t}, ΔFP^{-}_{t-1} and ΔFP^{+}_{t} show that farm price increases transmit to the retail level more fully and quickly than farm price decreases. The coefficients of $e^{+}_{RF,T-1}$ and $e^{-}_{RF,T-1}$ suggest that positive deviations from long-run equilibrium will correct more quickly than negative deviations but this difference is not significant and the null hypothesis of equality between them that is the test for symmetry in price transmission in long-run is accepted.

The ECM differs from the Houck model in its inclusion of $e^{+}_{RF,T-1}$ and $e^{-}_{RF,T-1}$ as additional explanatory variables. Since both were found to be significant, we may conclude that the ECM is superior to the Houck model. The F test for model selection (F=184.3) confirms the superiority of the ECM to the Houck model. However, both the Houck model and the ECM lead to a rejection of the null hypothesis of symmetric price transmission in the Iranian chicken market.

3. Threshold Model

To analyze price transmission behavior in the Iranian chicken market using Threshold approach, we first calculated threshold values using the grid search procedure to find the minimum value of the log of the determinant of the covariance matrix for the residuals as explained in the Methodology above. We found two thresholds (3.4) and (-5.4) and estimated the equations in (7) using the OLS method. The results of our estimation are presented in table 4. The high R^2 together with the statistical significance of the estimated regression coefficients confirm the goodness of fit of the model. The Durbin-Watson statistic suggests that serial correlation is not evident in this model. As expected, the coefficient of the error correction term in the second regime ($-5.4 \leq e_{RF,T-1} \leq 3.4$) is not significant.

The existence of two thresholds suggests that deviations in the positive and negative directions must reach different magnitudes before a response is triggered and hence price transmission in the Iranian chicken market is asymmetric in magnitude. A comparison between the coefficients of $e_{RF,T-1}$ in the first and third regimes confirms that there is asymmetry with respect to the speed of price transmission. As with the ECM and the Houck Model, D_{2003} is not a significant explanatory variable. This suggests the Iranian government's price stabilization policy has not been successful in decreasing retail chicken price fluctuations, at least at the retail level.

The Threshold Model confirms the results of the ECM and the Houck model in rejecting the null hypothesis of symmetric with respect to the speed of price transmission in the Iranian chicken market in short-run. However, the Threshold Model may represent an improved specification as it allows for the existence of thresholds of varying magnitudes.

CONCLUSIONS

In this article we used three alternative approaches to analyze the existence of asymmetric price transmission between the farm and retail levels in the Iranian chicken market. The three approaches involved using the Houck Model, the Error Correction Model (ECM) and the Threshold Model. The analysis suggests that farm prices (Granger) cause retail prices and all three approaches suggest the price transmission process is asymmetric in short-run. Statistical tests show that the ECM is superior to the Houck model and the existence of thresholds suggests that the Threshold model is superior to the ECM. Price transmission elasticities for farm price increases were found to be larger than for farm price decreases suggesting that the speed of price transmission is greater when prices are rising than when prices are falling in short-run. This is a positive asymmetric price transmission and is beneficial for marketing agents. On the other hand, results of ECM and Threshold model show that if the retail price is above its equilibrium, this deviation is corrected faster than if the retail price is below its equilibrium. This is a negative asymmetric price

Table 4: Threshold Model of Farm to Retail Price Transmission

Name of Variable	Estimated Parameter	t statistic
Dependent Variable: (First Difference of Retail Price)		
Intercept	19.95	4.95*
ΔFP_t **(1st Difference of Farm Price)**	1.27	23.57*
$e_{RF,\,t-1}$ **(Lag Error Term)**	-0.69	-6.41*
D_{2003} **(Government Policy)**	-1.03	-.29
R2	**0.9**	
D.W	**2.24**	
AIC	**5.14**	
SIC	**5.27**	
n	**75**	

$3.4 \le e_{RF,\,t-1}$

Name of Variable	Estimated Parameter	t statistic
Intercept	19.95	4.95*
ΔFP_t **(1st Difference of Farm Price)**	1.27	23.57*
$e_{RF,\,t-1}$ **(Lag Error Term)**	-0.69	-6.41*
D_{2003} **(Government Policy)**	-1.03	-.29
R2	**0.9**	
D.W	**2.24**	
AIC	**5.14**	
SIC	**5.27**	
n	**75**	

$-5.4 \le e_{RF,\,t-1} \le 3.4$

Name of Variable	Estimated Parameter	t statistic
Intercept	-9.71	-2.66**
ΔFP_t **(1st Difference of Farm Price)**	1.33	25.65*
$e_{RF,\,t-1}$ **(Lag Error Term)**	-0.43	-2.99**
D_{2003} **(Government Policy)**	-3.65	-1.14
R2	**0.9**	
D.W	**2.24**	
AIC	**5.14**	
SIC	**5.27**	
n	**75**	

$e_{RF,\,t-1} \le -5.4$

*Significant at 1% **Significant at 5%

transmission in long-run and is beneficial for consumers but this asymmetry is not statistically significant. Results of our estimation also suggest that the introduction of the Government's price stabilization policy has not been effective in decreasing price fluctuations, at least at the retail level. We also expected symmetric price transmission in presence of the Government's price stabilization policy but this hypothesis is rejected.

We believe that asymmetric price transmission in Iranian chicken market is the result of high inflation rates, and a non-competitive slaughtering industry. High inflation rates conduct to the positive asymmetric price transmission in two ways. First; inflation leads the consumers to expect continual price increases. Aguiar and Santana (2002) have found an evidence of asymmetric price transmission in presence of inflation in Brazil too. Second; as Ball and Mankiw (1994) mentioned, in presence of positive trend inflation rates, different adjustment costs lead to asymmetric price transmission. “In presence of positive inflation trend, positive shocks to firms’ desired prices trigger greater adjustment than do negative shocks of the same size. Indeed, inflation causes firms’ relative prices to decline automatically between adjustments. When a firm wants a lower relative price, it need not pay the adjustment cost, because inflation does much of the work. By contrast, a positive shock means that the firm’s desired relative price rises while its actual relative price is falling, creating a large gap between desired and actual prices. As a result, positive shocks are more likely to induce price adjustment than are negative shocks, and the positive adjustment that occur are larger than the negative adjustment.”

We believe that one of the reasons for asymmetric price transmission in Iranian chicken market is non-competitive structure and existence of market power in slaughtering industry. Thus, seeking for generating more competitive markets will help to have symmetric price transmission in Iranian chicken market and consumers will gain from positive welfare effects of symmetric price transmission.

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