

Welfare Impact of Changes in Maize World Price: Evidence from Iranian Meats Market

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Abstract: In this study impact of changes in maize world price on welfare of involved groups in meat market was evaluated using multi market framework. In addition, price transmission from world market to domestic one was also considered. The results showed an asymmetric (symmetric) price transmission from world market to domestic one in short (long) run. Based on the results a negative relation was found between society welfare and price changes in meat and poultry markets. Increase in maize world price may lead to increase in poverty indices especially poverty gap and poverty severity indices.

Key words: Maize Market • Meat Market • Price Transmission • Welfare Impacts • Poverty Indices

INTRODUCTION

In terms of the protein consumption in 2003 more than 38 percent of the Iranian urban households and 41 percent of the rural households has been under poverty line. The corresponding figures for calorie intake are 23.8 and 22.7 percent respectively [1]. Meat and meat products are of the main sources of the protein supply. As the statistics show during the period of 1980-2000 the expenditure share of the meat has changed in favor of the poultry and fish in urban Iran, pointing out more attention to poultry and fish providing sources. The main difference of the poultry as compared to other kind of the meat is that a great part of the main nutrition grain (maize) is provided via importing. The imported maize value exceeded \$ 377.2 billion in 2005 [2]. In addition, there is a relation between different kinds of meat, needing for coincident study of the markets. Linkage between the markets results in a flow of the changes among them [3].

While it is important to study the meat market due to the protein consumption, regarding the maize role in the Iranian poultry market pints out that the maize world market should be also considered. Iranian domestic meat market study is complicated as the domestic poultry market depends on the maize world market, needing for more deep examination of the consequences of the maize world market changes. A comprehensive approach is required to cope with the complexity. This approach

should include the meat and maize world and domestic market mutually. The approach is expected to develop some useful implications for the consequences resulted from maize world market changes in Iranian meat market. There is a great body of literature that examines the impact of the changes in world market on the interest groups, known as the liberalization effect. For example, Seshamani [4] for Zambia showed that liberalization in food market affects the welfare undesirably. Siddiqui and Kemal [5] for the case of the Pakistan pointed out that reducing the import tariffs may lead to improve in the welfare only if the foreign aides continue. Contrary to the mentioned studies Dorosh and Sahn [6] believe that trade liberalization in Cameroon, Madagascar and Niger has desired consequences for the rural and urban poor households. Bhasin *et al.* [7] argue that elimination of the trade taxes may improve the Ghanaian poverty. Reduced tariff showed an improving effect in the case of the Philippines [8]. Contrary to the potential desired effects expecting from the world trade liberalization, Iranian studies like Shoostarian [9] and Bakhshoodeh [10] showed that liberalization in wheat market will decrease the social welfare.

As was cleared by the literature some of the studies believe that convergence toward the world market may result in increased welfare and decreased poverty and some of them expect undesirable effects. However, the past works suffer from two deficiencies. First that the main

assumption is that convergence toward world market lead to lower prices, while the increase in prices of some products especially grains has been considerable after 2000 [11], pointing out needing for regarding the price increase as well. Second, the past works failed to consider the price transmission from one market to another, meaning that they assumed the price transmission process symmetric in speed and magnitude. Price transmission differs according to whether prices are increasing or decreasing [12]. Peltzman [13] emphasized some strange notes on economic theories by studying the price transmission of 282 products and product categories, including 120 agricultural and food products as he finds the price transmission an asymmetric process in most of cases. So that he strongly concluded that the standard economic theory of markets is wrong, because it does not predict or explain the prevalence of asymmetric price adjustment [13]. An example of asymmetric price transmission reported by Abdulai [14] among maize local markets in Ghana. Aguiar and Santana [15] also argue that farm prices are expected to show asymmetric price transmission.

An asymmetric price transmission between Iranian retail and farm gate markets of poultry [16] and meat [17] as well as between pistachio world and Iranian domestic market [18] was found. Regarding the new challenge of the increase of the grain prices in general and maize prices in special and the emergence of the doubts on the asymmetric prices transmission from world market to Iranian domestic market on one hand and the necessity of the providing the population with the protein need, mainly depending on the poultry, on the other hand, more consideration of the maize world market changes and its welfare consequences is obligatory. Since the Iranian domestic poultry market may be affected by the maize world market via an asymmetric price transmission so studding the price transmission is also crucial. This study is an attempt to cover the above challenges as it tries to study the effect of the price transmission from maize world market to domestic meat market while the price transmission pattern from maize world market to domestic market also is considered. The effects of the price transmission include the welfare changes of the producers and consumers as well as the changes in poverty indices including head count poverty gap and poverty severity indices.

MATERIALS AND METHODS

Maize is accounted for as main nutrient in poultry production industry. Since a great part of the Iranian

demand for maize comes from importing, changes in the maize world price results in a considerable change in poultry industry production costs. Based on the profit maximization condition, equality of the value of the marginal product and input price, increase (decrease) in maize pieces as main input is expected to lower (raise) the poultry production and to shifts the marginal cost and poultry supply upward (downward) as well as increase (decrease) of the poultry prices. Since there is a close relation among the different kinds of the meat, an increase (decrease) in poultry prices may lead to the substitution of the other kinds of the meat (poultry) for the poultry (other kinds of the meat). Economics theories examine the price influences in one market by another market(s) while they assume a symmetric price transmission implicitly. There is such a default while as insisted by the literature, asymmetric price transmission is more common as compared to the symmetric one. Regarding the price transmission importance we try to examine the price transmission process between Iranian and world maize market in addition to the Iranian domestic meat market. In other world in our analysis that focus on the developing the welfare implication for the Iranian meat market as the maize world prices changes, the price transmission pattern from world market to Iranian maize market also in considers concurrently. Meat market also contains the poultry, meat and fish markets as they are expected to have linkage. As pointed out by Jeong *et al.* [3] if there is close relation between the some markets, a change in one market will affect the other related markets as well. In the described approach, maize market relation with the meat markets is created by using the maize price in the poultry market. Our framework contains the supply and demand of the each meat market as follow:

$$Q_{d,t}^{pl} = Q_{d,t}^{pl}(P_t^{pl}, P_t^f, P_t^{rm}, Y_t, PP_t) \quad (1)$$

$$Q_{s,t}^{pl} = Q_{s,t}^{pl}(Q_{s,t-1}^{pl}, EP_t^{pl}, P_t^{rm})$$

$$Q_{d,t}^{rm} = Q_{d,t}^{rm}(P_t^{rm}, P_t^f, P_t^{pl}, Y_t, PP_t) \quad (2)$$

$$Q_{s,t}^{rm} = Q_{s,t}^{rm}(Q_{s,t-1}^{rm}, EP_t^{rm}, P_t^{fo})$$

$$Q_{d,t}^f = Q_{d,t}^f(P_t^f, P_t^{rm}, P_t^{pl}, Y_t, PP_t) \quad (3)$$

$$Q_{s,t}^f = Q_{s,t}^f(Q_{s,t-1}^f, EP_t^f, cp_t)$$

Where Q is the supply or demand amount in ton; P, price in Rials; Y, Iranian GNP; PP, population in million Rials; EP, expected price in Rials; and the subscripts and superscripts are as follow:

t, time; d, demand; s, supply; pl, poultry; f, fish; rm, meat; m, maize; fo, animal forage; and cp, capital cost.

In excess of 90 percent pf the Iranian fish consumption comes from the coastal waters [19]. Since the Iranian coastal fishmans use some equipment for hunting the fish, the capital price was applied as the main input price in the fish meat supply function. Equation used for measuring welfare changes also are as follow:

$$\Delta CSPL = \int_{P_0^{pl}}^{P^{pl}} Q_d^{pl}(P^{pl}) dP^{pl} \quad (4)$$

$$\Delta PSPL = \int_{P_0^{pl}}^{P^{pl}} Q_s^{pl}(P^{pl}) dP^{pl} \quad (5)$$

$$\Delta CSRm = \int_{P_0^{rm}}^{P^{rm}} Q_d^{rm}(P^{rm}) dP^{rm} \quad (6)$$

$$\Delta PSRm = \int_{P_0^{rm}}^{P^{rm}} Q_s^{rm}(P^{rm}) dP^{rm} \quad (7)$$

$$\Delta CSF = \int_{P_0^f}^{P^f} Q_d^f(P^f) dP^f \quad (8)$$

$$\Delta PSF = \int_{P_0^f}^{P^f} Q_s^f(P^f) dP^f \quad (9)$$

Where CS stands for consumers' surplus and PS also stands for producers' surplus. Regarding the Iran as a small importing country in maize world market the price transmission was considered as follow:

$$p_t^D = \alpha + \alpha_1 p_t^W + \mu_t \quad (10)$$

Where μ_t is a random error term with constant variance that can be contemporaneously correlated, p_t^D and p_t^W are price in domestic and world markets, respectively and α is coefficient. Long-run market integration test within this framework verifies whether any stable long-run relationship exists between the two price series. That implies μ_t , the errors, are stationary.

The Engle-Granger approach involves using μ_t from Eq. (10) to estimate ρ in the following relationship:

$$\Delta \mu_t = \rho \mu_{t-1} + \varepsilon_t \quad (11)$$

Where ε_t is a white noise process. If the residuals are stationary with mean zero the null hypothesis of no cointegration relationship will be rejected. In a second step, an ECM that relates changes in p_t^D to changes in p_t^W as well as the so-called error correction

term (ECT) – The lagged residuals from the estimation of Equation (3) – is estimated. Regarding that the ECT measures deviations from the long run equilibrium between p_t^W and p_t^D , so including it in the ECM allows p_t^D not only to respond to changes in p_t^W but also to 'correct' any possible deviations from the its long run equilibrium that may be left over from previous periods [20].

$$\Delta p_t^D = \alpha + \sum_{j=1}^k (\beta_j^+ D_t^+ \Delta p_{t-j+1}^W) + \sum_{j=1}^L (\beta_j^- D_t^- \Delta p_{t-j+1}^W) + \phi ECT_{t-1} + \gamma_t \quad (12)$$

Where Δ is the first difference operator, p_t^W and p_t^D are maize price in world and domestic markets, respectively, α , β_1^+ , β_1^- and ϕ are coefficients. K and L are also the lags-lengths. β_1^+ for the increasing world price phases and β_1^- for the decreasing world price phases, t is the current time period, D_t^+ and D_t^- are dummy variables with: $D_t^+ = 1$ if $p_t^W \geq p_{t-1}^W$ and $D_t^+ = 0$ otherwise; $D_t^- = 1$ if $p_t^W < p_{t-1}^W$ and $D_t^- = 0$ otherwise.

Splitting the ECT into positive and negative components (i.e. positive and negative deviations from the long-term equilibrium – ECT^+ and ECT^-) makes it possible to test for APT. The ECM, including lagged changes in p_t^W will be as following form:

$$\Delta p_t^D = \alpha + \sum_{j=1}^K \beta_j \Delta p_{t-j+1}^W + \phi^+ ECT_{t-1}^+ + \phi^- ECT_{t-1}^- + \gamma_t \quad (13)$$

Von Cramon-Taubadel & Loy [21] suggest that the Δp_t^W in Equation (13) can also be split into positive and negative components to allow for more complex dynamic effects:

$$\Delta p_t^D = \alpha + \sum_{j=1}^k (\beta_j^+ D_t^+ \Delta p_{t-j+1}^W) + \sum_{j=1}^L (\beta_j^- D_t^- \Delta p_{t-j+1}^W) + \phi^+ ECT_{t-1}^+ + \phi^- ECT_{t-1}^- + \gamma_t \quad (14)$$

The Eq. (14) was applied to test the asymmetry of price transmission for both of long and short run. For long run, symmetric price transmission is rejected if β_1^+ and β_1^- is significantly different from one another, which can be evaluated using an F-test. Long run symmetric price transmission also accepted if there is no significant difference between ϕ and ϕ^+ .

Impact of the changes in maize world price on poverty indices is studied examining the changes occurred in expenditure of the households when they are assumed to consume the same amount of the meat as before the maize price changes. The poverty indices are head-count, poverty gap and poverty severity.

In order to calculate effects of changes in maize world prices on poverty, FGT indices were used. These criteria are defined as [22]:

$$P_{\alpha} = \int_0^1 \left[\frac{Z-X}{Z} \right]^{\alpha} f(X) dX \quad (15)$$

$$\alpha \geq 0$$

Where x is household consumption expenditure, $f(x)$ is density function of household consumption expenditure; Z is indicator of poverty line, measured in terms of expenditure level and α is non-negative parameter. The above relation can be rearranged as follows.

$$P_{\alpha} = \left(\frac{1}{N} \right) \sum \left(\frac{Z-X}{Z} \right)^{\alpha} \quad (16)$$

Where N is number of population. High value of α indicates high sensitivity of poverty index to inequality among the poor. The value of $\alpha = 1, 2, 3$ are head-count, poverty gap and poverty severity, respectively [23].

$$P_{\alpha} = \left(\frac{1}{N} \right) \sum_{i=1}^n \left(\frac{Z-X_i}{Z} \right)^{\alpha} \quad (17)$$

The data used in this analysis includes two parts. First, a part of the data is times series of the introduced variables that are based on yearly observations obtained from the Food and Agriculture Organization (FAO) database [2] and Iranian Statistical Yearbook [19]. Export prices transformed to Iranian local currency (Rials) using free market exchange rate. Exchange rate series also was obtained from Iranian Central Bank statistics year books [24]. The data cover the period from 1974 to 2006 for time series estimation. The time series stationarity is tested using the augmented Dickey Fuller (ADF) test. The results not presented here for brevity. We also used the GMM approach to estimate the equations. The second part of our data is a cross section set that was applied for poverty implications. The cross-section dataset includes a sample of 12925 urban households obtained from household consumption survey in 2006. The data provide information on meat prices, consumption and expenditures and total expenditure of the selected households.

RESULTS AND DISCUSSION

The findings obtained during several stages of estimation. First, supply and demand of meat and poultry

was estimated using a multi market approach and GMM estimation technique. Stationary, diagonality, serial correlation and specification error are of the main tests performed in this stage. In next stage the price transmission pattern of maize world market to Iranian domestic market and causality relationship between Iranian and world market was tested. The results of the tests were dropped for brevity. The causality test also showed a one way causality of price formation from world market to domestic market. It was also cleared that there is a symmetric price transmission from world market to domestic market in long run, while an asymmetric transmission process was obtained in short run. So, the symmetric price transmission was regarded as long run while the asymmetric one was applied as short run pattern. In the next step the effect of asymmetric price transmission was net out by a dummy variable (Table 1). Price transmission pattern may be traced by dummy variable [25-26]. The new approaches to test the price transmission also use dummy variables. As presented in Table (1) assuming the symmetric transmission give rise to coefficient of 0.83 while netting out the asymmetric price transmission results in coefficient of 0.77. The coefficient of the dummy variable also is 50096. This figure means that world price transmission to domestic one is 50096 (in Rials per ton) higher than that is predicted by a symmetric based price transmission model. The figure may be considered as the difference of the price transmitted to domestic market in price increase and decrease. However, in the long run the coefficient of 0.83 is the amount of the price transmission. The difference between long run and short run coefficients may be related to time length that provide the possibility of adjustment to cope with the price changes. The specifications presented in the Table (1) is desirable based on the diagnostic tests.

Welfare Consequences of Maize World Price Change:

Table 2 presents the welfare effects of the changes in maize world price. As pointed out the study analyses the welfare effects of changes in maize world prices in framework of the symmetric and asymmetric price transmission separately. The interest groups in welfare analysis are producers and consumers. Three levels of price changes including 5, 10 and 15 percent were regarded for price increase and decrease scenarios. In general, As Table 1 shows increase in maize world price lead to decrease in society welfare and vice versa. Another notable point is that the welfare changes in short run are more considerable as compared to them in long run, because more time and possibilities are available in long run to cope with the price changes. Increase in maize

Table 1: Maize World Price Transmission under Symmetric and Asymmetric Assumptions

	Relation between domestic and world price under symmetric assumption				Relation between domestic and world price under asymmetric assumption		
	Coefficient	Standard Error	t Statistics		Coefficient	Standard Error	t Statistics
Intercept	3128	41344	0.8	Intercept	24097**	9493	2.38
World price	0.83***	0.06	13.45	World price	0.77***	0.03	25.34
AR(1)	0.83***	0.15	5.53	AR(1)	-0.80***	0.08	-9.74
				Dummy Variable	50096*	31615	1.68
Statistics	R ²	F			R ²	F	
	0.95	292.8***			0.96	203.8***	

*, ** and *** Significant at 10%, 5% and 1% level respectively

Table 2: Welfare Effects of Maize World Price Changes (Per capita-1000 Rials)

		Changes in producers welfare	Changes in consumer welfare	Changes in social welfare
Maize price increase under symmetric transmission assumption (long run) in percent	5	198.4	-914.3	-715.8
	10	1347.0	-1849.2	-502.1
	15	2606.0	-2823.9	-217.9
Maize price increase under asymmetric transmission assumption (short run) in percent	5	2980.6	-3104.2	-123.6
	10	4543.1	-4245.9	297.2
	15	6241.8	-5436.8	805.0
Maize price decrease under symmetric transmission assumption (long run) in percent	5	-24.4	585.5	561.1
	10	-146.1	489.8	343.8
	15	-265.2	394.4	129.2
Maize price decrease under asymmetric transmission assumption (short run) in percent	5	0.8	605.2	606.0
	10	-75.5	545.3	469.8
	15	-150.8	485.5	334.8

world prices will increase the producers' surplus as it results in higher prices of meat. Although increase in producers' welfare is more considerable in long run, it is highly sensitive to maize world price increase. So that, as maize world prices increased from 5 to 10 percent producers' welfare has raised by 5.8 times while the corresponding figure for short run is merely 52 percent. The corresponding figures for maize world prices increase from 10 to 15 percent are more than 90 and 37 percent in long and short run, respectively. Therefore, there is a trade off between the welfare changes magnitude and its sensitivity to maize world price changes in short and long run in the case of producers' welfare. However, it is conceived that the sensitivity tends to decline, in short and long run, as the price increases opts for higher amounts. In addition the difference between short and long run producers' welfare changes tends to decrease seriously as higher price increments are chosen. The producers' welfare changes in short run is more than 15 times as high as it is in long run when the 5 percent increase in maize world price is chosen, while the corresponding figures for 10 and 15 percents are 3.4 and 2.4 times, respectively.

Although, in the case of consumers like producers, the welfare effects are more considerable in short run as

compared to long run, there is some differences between the producers and consumers welfare effects. For the consumers and in the case of each maize world price changes the difference between long run and short run is lower than that of the producers. For example, in the case of 5 percent increase in maize world price, increase of the short run welfare effect is 3.4 times as high as the long run, while the corresponding figure for the producers was found more than 15. A similar arrangement exists for 10 and 15 percent price changes. Therefore, the adjustment rate of welfare is more considerable for producers in comparison with consumers. Contrary to the producers and consumers that price increment is expected to increase (decrease) the welfare of the producers (consumers) and vice versa, in the case of the social welfare a different condition is observed. Social welfare, as aggregate welfare of the producers and consumers, tends to increase as maize world price decreases in long and short run. However, for the maize price decreases an equivocal condition is observable. Maize price increase lead to a higher social welfare in long run in all of three price increments and price decrease by 5 percent, while for the 10 and 15 percent increases in short run a positive welfare changes is expected.

Table 3: Effect of Maize World Price Changes on Poverty Indices among Urban Households

			Head count index	Poverty gap index	Poverty severity	
			Current amount	29.02	8.11	3.26
Maize price increase under symmetric transmission assumption (long run) in percent	5	Poverty index	29.25	8.20	3.30	
		Change (%)	0.79	1.11	1.23	
	10	Poverty index	30.99	8.75	3.54	
		Change (%)	6.79	7.89	8.59	
	15	Poverty index	33.06	9.47	3.86	
		Change (%)	13.92	16.77	18.40	
Maize price increase under asymmetric transmission assumption (short run) in percent	5	Poverty index	33.81	9.77	3.99	
		Change (%)	16.51	20.47	22.39	
	10	Poverty index	36.12	10.68	4.40	
		Change (%)	24.47	33.91	34.97	
	15	Poverty index	38.96	11.68	4.87	
		Change (%)	34.25	44.02	49.39	
Maize price decrease under symmetric transmission assumption (long run) in percent	5	Poverty index	28.86	8.07	3.25	
		Change (%)	-0.55	-0.49	-0.31	
	10	Poverty index	28.74	8.03	3.22	
		Change (%)	-0.96	-0.99	-1.23	
	15	Poverty index	28.61	7.99	3.21	
		Change (%)	-1.41	-1.48	-1.53	
Maize price decrease under asymmetric transmission assumption (short run) in percent	5	Poverty index	28.85	8.06	3.24	
		Change (%)	-0.59	-0.62	-0.61	
	10	Poverty index	28.63	8.00	3.21	
		Change (%)	-1.34	-1.36	-1.53	
	15	Poverty index	28.45	7.94	3.18	
		Change (%)	-1.96	-2.10	-2.45	

As presented in Table 2, maize world price decrease in all of the selected levels lead to higher social and consumers' welfare while the welfare of the meat producers decrease. In terms of the welfare magnitude the price increase effects are more considerable as comparison with price decrease welfare effects. Like the price increase scenarios in the case of the price decrease the welfare effects for consumers and whole of the society will be higher in short run as compared to long run. However, in the case of the producers a reverse arrangement is conceivable. So that, as the maize world price decreases the producers welfare changes in long run are more considerable as compared to short run in absolute value. In addition, in short run, the sensitivity of the welfare of producers and consumers tends to decrease as the maize world price opts to higher amount. However, the same reaction is expected by producers in long run. While contrary to the price increase scenarios and to the price increase and price decrease scenarios in the case of the producers, for the consumers and whole of the society a higher sensitivity is expected as the maize price more decreases.

In general, increase in maize world market, in long run, results in decreased social welfare and lower prices increases the social welfare. However, in terms of the magnitude of the welfare changes, maize world price increase lead to more substantial effects as compared to the price decreases. As cleared before, the price transmission from maize trade market to Iranian domestic

market is symmetric statistically in long run, however, as we try to trace the price transmission in framework of welfare changes an asymmetric process come to exist. For example, 5 percent increase in maize world price bring about a per capita social welfare reduction of 715.8 thousand Rials while the corresponding figure for the 5 percent reduction in maize world price is 561 thousand Rials increment in per capita social welfare. In short run, the social welfare effects occurred for maize world price increases of 5 and 10 percent is higher than that of the price decreases (of curse they are in opposite direction), however, in the case of the 15 percent price changes the social welfare changes as the maize world price increases is 2.4 times as high as of the one occurred by maize world price reduction. So, if we want to develop a concept like the price transmission for social welfare some interesting implication may be obtained. First, the welfare change is asymmetric not only in terms of the increase or decrease of the maize world price but also in terms of the level of the price changes as well as in terms of the time period is asymmetric.

Another consequence of the changes in maize world price is its distributional effects between meat producers and consumers. Another distributional effect exists between Iran as maize importing and the maize exporting countries. As was cleared by the results when the maize world price tends to increase a social loss comes about in Iranian meat market and an equivalent to the loss a benefit comes to exist in the other Iranian markets and maize world market.

Impact of Maize World Price Change on Poverty Indices:

Table (3) presents the effect of changes in maize world price on the poverty indices. In order to evaluate the maize price change effects the, expenditure of the different types of the meat was extracted for different income deciles. Then the effect of the price changes on poverty indices was examined in terms of the changes in meat expenditure in each income deciles. As is expected from the taken approach for the lack of the price elasticities among different deciles we assumes the meat consumption amount same as the before maize world price changes and whole of the expenditure changes results from the meat price changes.

In order to compare the changes occurred in poverty indices they were expressed in percentage changes. The sample applied to examine the poverty indices includes the Iranian urban since more reliable data are available for the urban households. Based on the Table (3) more than 29 percent of the urban households are poor. A general review of the Table (3) shows a kind of the asymmetric effect like that observed for welfare effects. As is obvious in the Table the effect of the maize price increase, in all scenarios, on the poverty indices is more considerable as compared to the maize price reduction effects. For example, 10 percent increase in maize price increases the headcount index by 24.47 and 6.79 percent in short and long run respectively, while the corresponding figures for 10 percent decrease of maize world price are 1.34 and 0.96. For the other levels of the maize world price changes the same arrangement exists. In addition, there is an asymmetric effect between long and short run like that was observed for welfare effects. Maize world price changes affects poverty indices more seriously in short run rather than long run. For example, 5 percent increase in maize world price in long run increase the poverty indices of headcount, poverty gap and poverty severity by 0.79, 1.11 and 1.23 respectively while the figures for the same amount of the price increase in short run are 16.51, 20.47 and 22.39. As the maize world price is expected to decrease by 5 percent in long run headcount, poverty gap and poverty severity indices decrease by 0.59, 0.49 and 0.39 percent respectively and the corresponding figures for the short run are 0.59, 0.62 and 0.61 percent. Another fact is that the figures of the long and short run in price decrease scenarios are more close to each other as compared to the results obtained for price increase. In other world although as the maize price decreases the poverty indices tend to improve, the difference between the long run and short run improvements are not so considerable. This fact isobvious in the case price decrease by 5 percent.

There some differences among the poverty indices in that they are affected by the price changes differently. Maize world price increase affects the poverty severity index more considerable. In other words the maize world price increase affects the poorest households more seriously than other poor households. In addition increase of the price increment from 5 to 10 percent results in an undesirable position for the poverty indices. However, the same holds in the case of price increment from 10 to 15 percent, but the changes occurred due to price increases from 5 to 10 is more considerable than that resulted from the 10 to 15 percent price increase. Contrary to the effects of the price increase for the price decrease there is low difference between poverty indices and improvements resulted from price decrease for all of the indices. In addition in the case of price decrease the effects of the price changes in form of the improvement in poverty indices for different levels of the price decrease is closer than that observed for different levels of the price decreases. For example, there are low differences between the improvement resulted from price decrease from 5 to 10 percent and that occurred as price decrease from 10 to 15 percent. Poverty is expected to increase by 10 and 4 percent in short and long run respectively, as the maize world price increase by 15 percent while the same amount of the price decrease in maize world price reduces the poor only less than 1 percent.

CONCLUSION

In general, maize world price increase is transmitted to domestic market more rapidly and completely than price decrease, resulting in considerable welfare effects and changes in poverty indices. In other words the price transmission from maize world market to maize domestic market is asymmetric. However, an asymmetric transmission process is conceivable in the meat market that maize is applied as a production input. This asymmetric price transmission process occurs between maize domestic market and meat market. This asymmetric transmission process was observed in terms of the welfare changes experienced by consumers.

Also, in the case of the poverty indices it was found that maize world price increase, irrespective of the adjustment period, affects the indices more considerable as compared to price decrease. In other world, even with asymmetric price effect from maize world market to domestic market consumers is not expected to enjoy from the symmetric price transmission and in the next chain some undesired welfare consequences may be inevitable. Iranian works like Hosseini and Nikookar[14] and Hosseini and Ghahremanzadeh [13] also showed an asymmetric

price transmission throughout marketing stages in meat market in Iran. Our results obtained for the welfare effects and poverty indices also show this asymmetric process in meat market. It was found that changes in welfare and poverty indices are more considerable in short run as compared to long run, especially more vigorous difference is observed for in the case of the maize world price increase. In general the poor is expected to be affected more undesirably by the maize world price increase in short run, needing for government intervention to cope with the condition. However, it is needed to focus on the asymmetric price transmission from maize domestic market to meat market.

REFERENCES

- Jafari Sani, M., 2006. Time and location based investigation of the poverty and food insecurity in Iran. M.Sc. thesis in Agricultural Economics. Shiraz University, Iran, (In Persian).
- FAO Statistical Database, 2006. <http://www.fao.org>.
- Jeong, K.S., P. Garcia and D.S. Bullock, 2003. A statistical method of multi-market welfare analysis applied to Japanese beef policy liberalization. *J. Policy Modeling*, 25: 237-256.
- Seshamani, V., 1999. The impact of market liberalization on food security in Zambia. *Food Policy*, 23(6): 539-551.
- Siddiqui, R. and A.R. Kemal, 2002. Remittances trade liberalization and poverty in Pakistan: The Role of Excluded Variables in Poverty Change Analysis. Working Paper, Pakistan Institute of Development Economics.
- Dorosh, P.A. and D.E. Sahn, 2000. A general equilibrium analysis of the effect of macroeconomic adjustment on poverty in Africa. *J. Policy Modeling*, 22(6): 753-776.
- Bhasin, V. and S.K. Annim, 2005. Impact of elimination of trade taxes on poverty and income distribution in Ghana. Working Paper. <http://imf.org/external/np/res/seminars/2005/macro/pdf/bhasin.pdf>.
- Cororaton, C.B. and J. Cockburn, 2005. Trade reform and poverty in the Philippines: A computable general equilibrium micro simulation analysis. Project report of International Development Research Centre (IDRC). http://www.cirpee.org/fileadmin/documents/Cahiers_2005/CIRPEE05-13.pdf.
- Shooshtarian, A., 2003. Study of Iran wheat market liberalization impact on social welfare and poverty. MSc thesis. Shiraz University Shiraz (In Persian).
- Bakhshoodeh, M., 2001. Investigating impacts of elimination of government intervention from wheat market. *Agricultural Economics and Development*, 35: 177-161. (In Persian).
- IFPRI, 2006. <http://www.ifpri.org>.
- Cramon-Taubadel, V.S. and J. Meyer, 2000. Asymmetric price transmission: Fact or artifact? University Göttingen. Institute for Agricultural Economy. Working Paper.
- Peltzman, S., 2000. Prices rise faster than they fall. *J. Political Economy*, 108(3): 466-502.
- Abdulai, A., 2000. Spatial price transmission and asymmetry in the Ghanaian maize market. *J. Development Economics*, 63: 327-349.
- Aguiar, D.R.D. and J. A. Santana, 2002. Asymmetry in farm to retail price transmission: Evidence from Brazil. *Agribusiness*, 18(1): 37-48.
- Hosseini, S.S. and A. Nikoukar, 2006. Asymmetric price transmission and its impact on market margin in Iran chicken industry. *Iran Agriculture Science*, 37(2): 1-9. (In Persian).
- Hosseini, S.S. and M. Ghahremanzadeh, 2006. Asymmetric adjustment and price transmission in Iran meat market. *Agricultural Economics and Development*, 53: 1-22. (In Persian).
- Hosseini, S.S. and A. Doorandish, 2006. Iranian pistachio price transmission pattern in world market. *Iran Agriculture Science*, 37(2): 145-153. (In Persian).
- Iranian Statistical Center, 2006. Household Expenditure Survey. Tehran. From <http://www.Sci.org.ir>.
- Meyer, J. and S. V.Cramon-Taubadel, 2004. Asymmetric price transmission: A survey. *J. Agricultural Economics*, 55(3): 581-611.
- Cramon-Taubadel, V.S. and J.P. Loy, 1996. Price asymmetry in the international wheat market: Comment, *Canadian J. Agricultural Economics*, 44: 311-317.
- Datt, G., 1998. Computational tools for poverty measurement and analysis. FCND Discussion Paper, No. 50, <http://www.ifpri.org>.
- Minot, N. and F. Goletti, 2001. Rice market liberalization and poverty in Viet Nam. IFPRI Research Report. <http://www.ifpri.org/sites/default/files/publications/tr114.pdf>.
- Central Bank of Iran, 2006. Tehran. From <http://www.cbi.org>.
- Houck, J.P., 1977. An approach to specifying and estimating nonreversible Functions. *American J. Agricultural Economics*, 59: 570-572.
- Ward, R.W., 1982. Asymmetry in retail, wholesale and shipping point pricing for fresh vegetables. *American J. Agricultural Economics*, 62: 205-212.