Asymmetry in farm-retail price transmission in the Turkish fluid milk market

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Jel Classification: D43, Q11, Q18

Abstract

This study investigates the price asymmetry in farm-retail price transmission in the Turkish fluid milk market. An asymmetric error correction model is applied on the monthly price data, and the results suggest that there is a positive price asymmetry in the farm-retail price transmission in the Turkish milk market. That is, the retail prices tend to adjust more quickly to the input price increases than to their decreases which yield welfare losses to the consumers. In addition, cointegration results imply that there is a significant market power in the Turkish fluid milk market. Therefore, the results of this paper support the view that retailers (as well as processors) can exercise significant market power as highlighted by asymmetric price responses in the Turkish milk market.

Keywords*: price asymmetry, retail prices, milk, Error Correction Model, Turkey.*

Résumé

Dans cette étude, nous avons évalué l'asymétrie dans la transmission des prix entre production et consommation sur le marché du lait de consommation en Turquie. Nous avons appliqué un modèle à correction d'erreur asymétrique aux données des prix mensuels et les résultats ont mis en évidence qu'il existe une asymétrie des prix positive dans la transmission des prix entre production et consommation sur le marché du lait en Turquie. Dans les faits, les prix à la consommation tendent à s'adapter plus rapidement à l'augmentation plutôt qu'à la diminution des prix des intrants, ce qui entraîne des pertes en termes de bien-être du consommateur. En outre, les résultats de la cointégration indiquent un grand pouvoir de marché en ce qui concerne le lait de consommation en Turquie. Les réponses asymétriques des prix sur le marché du lait en Turquie amènent donc à conclure que les distributeurs (tout comme les transformateurs) peuvent exercer un pouvoir de marché significatif.

Mots-clés: asymétrie des prix, prix à la consommation, lait, modèle à correction d'erreur, Turquie.

1. Introduction

Price transmission processes in the food marketing chain have received considerable attention as the markets become more concentrated in many countries. This, in turn, emanates from the structural transformation in which the retailers gain greater market power and the links between the production and retail stages become indistinct. An important sign of the market power is the existence of price asymmetries which indicate an unbalanced relationship between the price increases and decreases for a product through the farm gate and retail stages. More specifically, if the price transmission between the specific stages of the supply chain is asymmetric, then the price changes at the production level are not passed to price changes at the processing and/or retail level quickly or fully as in the case of a symmetric transmission. Furthermore, price asymmetries could be negative or positive depending on their effect. A positive (negative) price asymmetry occurs when a decrease (increase) in prices at the farm level is not fully or immediately transmitted, but an increase (decrease) passes on more quickly or fully to the final consumer (Meyer and von Cramon-Taubadel, 2004; Vavra and Goodwin, 2005). Price asymmetries are important because they usually have a negative impact on welfare (Meyer and von Cramon-Taubadel, 2004; Hahn, 1990).

There are a number of reasons for incomplete (asymmetric) price transmissions, such as market power and concentration at processing and retail levels (Peltzman, 2000; Meyer and Von Cramon-Taubadel, 2004; Azzam, 1999), adjustment and menu costs (Meyer and Von Cramon-Taubadel, 2004, Bailey and Brorsen, 1989). According to Peltzman (2000), competitive as well as oligopolistic market structures simply cannot be the reason for the presence of asymmetric price transmissions; hence, it could not imply market power. However, a great deal of research has implied market power to be the most important cause for the intense transmissions of price increases (Bernard and Willet, 1996; Aguiar and Santana, 2002).

As indicated by Peltzman (2000), asymmetric price transmission is the rule rather than the exception, and much scholarly work has revealed that asymmetric price transmissions are quite common, especially in agriculture (see Meyer and von Cramon-Taubadel, 2004; Frey and Manera, 2007). For example, Goodwin and Holt (1999) note that the direction of causality in agricultural supply chains flow from the farm level to the retail level. Asche *et al*. (2007) found a high degree of price transmissions in the supply chains as well as the integrated markets for salmon fish. According to Bernard and Willet (1996), downward movements in wholesale price passed on more fully to the growers than the increases in the wholesale price in their study

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regarding the broiler industry in the US where the concentration ratios of the processors are high during the 1983-1992 period, and where the industry is vertically integrated and the production is mostly done under contracts. Vavra and Goodwin (2005) found significant asymmetries in the farm, wholesale and retail chain for U.S. beef, chicken and egg sectors. In his study on the Swiss pork sector during the period 1988-97, Abdulai (2002) found evidence of asymmetric pricing behavior of retailers.

When we consider the dairy products, the empirical literature has shown similar results regarding the existence of asymmetric price transmission. Serra and Goodwin (2003), for instance, found limited asymmetries in sterilized milk in the Spanish dairy industry, while Capps and Sherwell (2005) observed that milk prices at the retail level adjust more slowly to the decreases and more quickly to the increases in milk prices at the farm level in the seven cities of U.S. Lass (2005) found evidence of short-run price asymmetries in the retail milk price in the northeast of U.S. and observed that retail milk prices do not return to the same level following the equivalent price increases and decreases, causing an increase in the marketing margins. Fernández-Amador *et al*. (2010) analyzed the dairy sector in Austria and found asymmetries in the price transmission of milk products. Other researchers found similar asymmetries by applying different econometric methods; Acosta and Valdes (2013) for Panama, Falkowski (2010) in the Polish fluid milk sector and Rezitis and Reziti (2011) in the Greek milk market.

This study investigates the price asymmetry in farm-retail price transmission in the Turkish fluid milk market. Although the price asymmetry in farm-retail price transmission is a popular research topic for agricultural economists, to the best of our knowledge, farm-retail price asymmetry of fluid milk has not been empirically investigated in Turkey. This research topic is also important for other reasons. For instance, there were important changes in Turkey, during the late 2000s in the dairy sector, i.e. an increase in the number of farms, dairy cow herd, and in product specialization and intensification. Although the dairy sector appears to be improving, the price formations in the dairy markets are causing the demand for dairy products to become concentrated. Since the Turkish farmer cooperatives are not efficient, the sector is mainly characterized by marketing contracts, in which farmers do not have reasonable market power and the farm-level price of milk is mainly determined by the industry. The selling price of a standard quality milk at the farm gate in Turkey in April 2013 was around 0.80 TL (0.44 USD), but the price of UHT milk in the market shelves was around 2.45 TL per liter (1.36 USD). The huge difference between the farm gate and the retail prices cannot be solely explained by cost or other considerations, but possibly by the existence of significant market power resulting from the non-competitive markets by the processors and retailers. Therefore, the differences between the farm gate and retail-level prices are of significant interest.

The paper is organized as follows. Section 2 provides an overview of the dairy sector in Turkey. Data, methodology and empirical results are provided in Section 3. In section 4 we discuss the relation between market structure and the asymmetric speed of price adjustment in the Turkish liquid milk market. Finally, concluding remarks are given in Section 5.

2. An Overview of the Dairy Sector in Turkey

Turkey is among the 15 largest milk producers in the world. Livestock farming accounts for one-third of the agricultural GDP, involving some 2.5 million enterprises. The total annual milk production is approximately 15 billion liters. About 90 percent of this production is cow milk and the rest comes from goat, sheep, and buffalo. The production conditions vary considerably between the Western and the Eastern parts of the country. In this respect, the climatic conditions are more favorable in the Western regions, allowing the development of commercially-oriented dairy farming. In contrast, extensive smallholder dairy farming prevails in the Eastern and Northern regions, where production is characterized by subsistence farming and the lack of a professional approach to production. Therefore, the local native cattle are mostly found in the Central and Eastern Anatolia, whereas pure breeds are more dominant in the western regions.

There was an increase in the number of cattle from 9.8 million in 2008 to 12.3 million in 2011. The number of milking cows, however, increased from 4.4 million to 4.7 million in the same period (Table 1). Milk yields vary according to breed: 3,881 kg per lactation for pure-breed cattle; 2,711 kg per lactation for crossbreed; and 1,317 kg per lactation for native breed. The national average lactation yield is 1,700 kg per lactation period.

Table 1 - *Total number of milking animals (Million heads).*

	Total	Cattle	Sheep	Goat	Buffalo
2002	21.6	4.39	13.6	3.5	0.51
2003	20.7	5.04	12.4	3.1	0.57
2004	16.3	3.87	9.9	2.4	0.39
2005	16.6	3.99	10.1	2.4	0.38
2006	16.8	4.18	10.2	2.4	0.36
2007	16.6	4.22	10.1	2.2	0.30
2008	15.7	4.08	9.6	1.9	0.32
2009	15.4	4.13	9.4	1.8	0.32
2010	17.5	4.38	10.5	2.5	0.35
2011	19.3	4.76	11.5	3.0	0.40

Source: Turkish Statistical Institute (2012).

Dairy products have an important role in the Turkish diet. Very little liquid milk is consumed; the most common form of consumption is yoghurt, followed by white cheese (feta type) and ayran, a liquid salted milk drink. The annual per

capita consumption of milk and milk products amounts to 132 liters, a figure that is low compared to other European countries. In 2011, the total production exceeded 15 million tons, a 42 % increase as compared with the production in 2003. Of the total production of about 15 billion liters of milk, 3 billion liters are used by farm families for their own consumption or processing, 1 billion liters are handled by street vendors, over 2 billion liters are processed by *mandira*s (small, simple processing establishments) and well over 3.5 billion liters are processed by medium- and large-sized dairies. More than 6 billion liters of milk are handled outside any formal quality control, unpasteurized and unpacked. Dairies find it difficult to obtain sufficient quantities of high quality raw milk. The collection and quality control naturally increase the cost of raw milk by 10 to 15 percent. As a consequence final consumer prices for dairy products and processed milk become high, which is the reason why large part of the population turns to the informal sector to obtain milk. The production of raw milk is mainly from cows and accounts for 92.35% of the total production in 2009, 91.69 % in 2010 and 91.67 % in 2011 (Table 2).

Table 2 - *Cattle milk production (Million liters).*

	2009		2010		2011	
Milk Production	12.5	100 %	13.5	100 %	15.0	100 %
Milk From Cattle	11.5	92.35 %	12.4	91.69 %	13.8	91.67 %
ulture Breed	5.7	45.55 %	6.3	46.58 %	7.2	48.08 %
ross Breed	4.5	36.56 %	4.8	35.90 %	5.3	35.48 %
omestic Breed	1.2	10.24 %	1.2	9.21 %	1.2	8.11 %

Source: Turkish Statistical Institute (2012).

In Turkey, dairy processing industry received a considerable investment, and the number of modern milk processing plants has increased over the last few years. Parallel to this increase in the number of processing firms, the amount of milk produced and processed has also increased. Most of the processing factories are equipped with ultra-modern technology. In this respect, there are eight dairy processing or affiliated companies among the top 500 Turkish companies. Leading companies in this sector are primarily organized under two institutions; SETBİR (Union of Dairy, Beef, Food Industrialists and Producers of Turkey) and ASÜD (Association of Packed Milk and Milk Products Manufacturers). Cooperatives such as the Central Union for Livestock Cooperatives are supporting the producers. Cooperatives and the cooperative unions, which mostly work at regional level and have inefficient structures, offer some support for milk collection, provision of cooling tanks, milk quality control, and the sale of milk to other processors. Other services include input procurement, provision of veterinary services, the supply of animal feed, and seeds, and training/education.

The modern large dairies seem to develop without any public support. Some of them produce in line with the EU standards and face considerable price pressure from large supermarket chains. In addition, the dispersed location of production units in much of the country causes a very costly and inefficient milk collection system. Two issues emanate from this; on the one hand, this situation feeds into the street milk sector, where uncontrolled, unpasteurized and low-quality milk is delivered to consumers at a low price. On the other hand, the processors are not able to produce dairy products at a cost that is affordable to the common consumer and become compatible in the European context.

As stated before, considerable amount of milk is processed by small-scale, labor intensive processing units called *mandira*. They do not usually possess a milk collection and distribution system and mainly concentrate on production alone. Moreover a significant number of *mandiras* are run seasonally and unregistered (CEEC, 2006; FAO, 2007) and could process between 18% and 35% of the milk produced. Farm family consumption is estimated in the range between 15 and 40%, including the milk fed to farm animals. The direct sales to the final consumer are about 30% of the milk production.

Another drawback is that the structure of farm holdings is inadequate for intensive production, since most of the holdings (85%) own less than 9 animals. These holdings account for 57% of the total number of animals. The share of holdings possessing more than 50 animals is 3.6% and the average animal number (herd size) per holding is 5.7 heads. 97.7% of the animals in the holdings producing milk had between 1 and 25 heads in 2005, while 0.02% of them had more than 100[1].

In 2010, as a policy, the Turkish Agricultural Bank opened long-term credits with zero interest rates for dairy and feeding cow breeders in order to support the industry. These convenient credits allured the investors and a gold rush started. During the years 2010 and 2011, the total credits used by the industry amounts to 5.9 billion Turkish liras (about 3.28 billion USD), and 4.3 million cows (milk and feed) were purchased by the new enterprises, as well as the old firms. Many investments related to the dairy processing industry become equipped with high technology, and the result was an increase in the production of milk, altering the price of raw milk. Also, the industry observed new labels entering the market with most of the retail chains producing their own brands and starting to compete with the others in the market.

The collected cow milk is processed into drinking milk, cheese, yoghurt, ayran (a drink made of yoghurt) and other

[1] Milk producers can be classified into four categories (FAO, 2007): a) Self-sufficient producers having one or two cows. They consume the milk themselves, b) Small producers with 3 to 10 cows. They sell the milk to consumers, the collecting center, *mandiras*, or other milk processing units, c) Medium-sized producers with 10-50 cows. They perform dairy farming commercially and sell their milk to the processors, and d) Professional producers with 100 and more cows.

dairy products like butter, kefir, milk cream, and ice cream. The drinking milk production by the industry has showed an upward trend since 2010. Two main improvements triggered this as well as each other. First, as the industry improved, the new comers and the old firms began to increase their production. Second, as the process of urbanization accelerated and the supermarkets gained more importance in terms of consumers shopping preferences, consumers started to buy and use more milk and other dairy products, especially those packed for different consumption purposes that allowed milk to be stored in houses for a longer duration, from the supermarkets.

Generally speaking the production costs of milk are high in Turkey and raw-milk producers work with low-profit margins mainly due to the costs of feed and other services. Production based on contract is common in the dairy sector and the producers sell their raw milk to major processors; consequently, there is a high concentration in the sector. This indicates that the raw milk producers face unfair competition in the marketing of their milk, and that the price is mainly determined by the industrial processors independent from the cost of production. However, the producer revenue consists primarily of the sales of the milk, and secondarily, the sales of the animal, naturally making the cost of production undoubtedly important. One of the discontents of the raw milk producers is that the progress of the prices of raw milk is significantly lower than the progress of the main costs, and the level of raw milk is much lower than the final goods processed from it. Thus, it is easily understood that the value is acquired not in the production stage but in later stages of the supply chain. In other words, the real winners are not the producers, but the holders of the last stage, where the goods are sold to the final consumers.

3. Data, Model and Empirical Results

3.1. Data

In order to analyze the price asymmetry in the Turkish Dairy sector the average monthly raw milk prices (RWMP) and average retail milk prices (RMP) are used for the period from January 2003 to December 2012. Both prices are obtained from the Turkish Statistical Institute (TURKSTAT). Figure 1 shows the time plot of RMP and RWMP. As expected these two variables seem to be non-stationary.

Table 3 presents the unit root test (ADF) results. As is clear from this table, for the *levels* of both variables, the null hypothesis of a unit root is not rejected at 1% significance level by the ADF tests without the trend. However, ADF tests, including the trend term, indicate the possibility of trend-stationarity in the data[2]. These results imply that the existence of unit roots is not clear in these two variables. Therefore, we will consider this ambiguity in our empirical analysis below.

[2] The null hypothesis for the first differences of the two variables is rejected (p-values=0.0000).

[3] This sub-section partly draws from Bor and İsmihan (2013).

Figure 1 - T*ime Plot of Raw Milk Prices (RWMP) and Retail Milk Prices (RMP).*

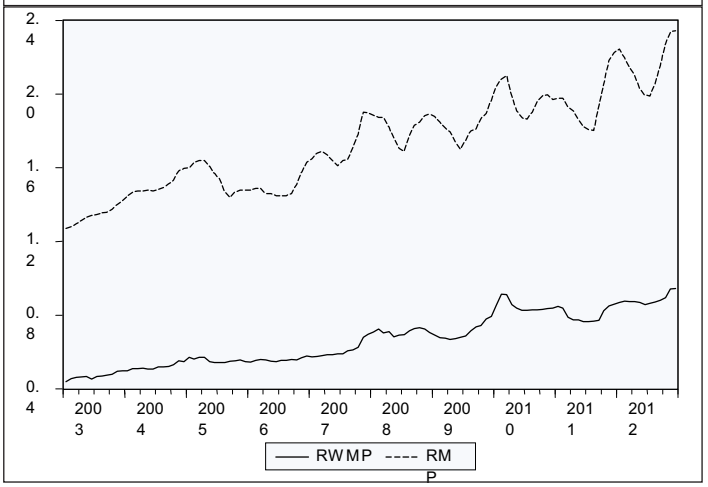

Table 3 - *ADF Tests.*

Variables	ADF Tests		
	Level		First Difference
	Without Trend	With Trend	Without Trend
RMP	-0.9288 (3)[a] [0.7759][b]	-6.2481 (1) [0.0000]	-7.2284 (5) [0.0000]
RMWP	-0.4763 (1) [0.8907]	-3.4538 (1) [0.0493]	-7.2913 (0) [0.0000]

[a] Figures in parentheses are the optimal lag length chosen by the Schwarz Bayesian Criterion (SBC). Max lag=12.
[b] Figures in square brackets are p-values.

3.2. Model and Methodology

In order to analyze the relation between the retail and raw milk prices, the standard Engle and Granger (EG) approach is used due to the possible non-stationarity in the data (Bacon and Kojima, 2010)[3]. Initially, the long run equilibrium relationship between the retail milk price (RMP) and raw milk price (RWMP) is estimated by the following equation:

$$RMP_t = \beta_0 + \beta_1 RWMP_t + u_t, \quad (1)$$

where RMP is the monthly retail price of milk and RWMP is the monthly raw milk price and u is the error term.

Since Equation (1) relates the output price (RMP) to the input price (RWMP), β_1 is expected to be 1 to show that input costs are passed fully to the final (retail) prices over the long run (Bacon and Kojima, 2010).

In order to provide a *benchmark* for the *asymmetric* Error Correction Model *(*ECM*),* consider the following *symmetric* ECM specification.

$$\Delta RMP_t = \sum_{i=1}^{k1} \delta_{hi} \Delta RMP_{t-i} + \sum_{i=0}^{k2} \delta_{ni} \Delta RWMP_{t-i} + \phi(RMP_{t-1} - \beta_0 - \beta_1 RWMP_{t-1}) + \varepsilon_t \quad (2)$$

where, Δ is the difference operator, ε is the error term and all variables are as defined earlier.

Equation (2) gives us the basic error correction model without any asymmetry. Here δ_{hi} measures the short-run im-

pact of the lagged (*t-i*) retail prices of milk and δ_{ni} measures the short-run impact of raw milk prices (at *t-i*) on the price of retail milk price, φ is the long-run equilibrium adjustment parameter and the disequilibrium term $RMP_{t-1} - \beta_0 - \beta_1 RWMP_{t-1}$, (*or* u_{t-1}.) is derived from the long-run relation between retail price of milk and raw milk as stated in Equation 1. The parameter φ is also interpreted as the adjustment speed to correcting short-run disequilibrium.

In the case of asymmetric pricing, the adjustment process could be different for increases than for decreases in input prices. Following Granger and Lee (1989), in order to allow for asymmetries, the first differences on the variables are decomposed into their positive and negative components at each time period (t). Therefore, ECM for the asymmetric case can be specified as follows:

$$\Delta RMP_t = \sum_{i=1}^{k1} \delta_{hi}^{+} \Delta RMP_{t-i} + \sum_{i=0}^{k2} \delta_{ni}^{+} \Delta RWMP_{t-i} + \varphi^{+}(RMP_{t-1} - \beta_0 - \beta_1 RWMP_{t-1}) \quad (3)$$
$$\sum_{i=1}^{k1} \delta_{hi}^{-} \Delta RMP_{t-i} + \sum_{i=0}^{k2} \delta_{ni}^{-} \Delta RWMP_{t-i} + \phi^{-}(RMP_{t-1} - \beta_0 - \beta_1 RWMP_{t-1}) + \varepsilon_t$$

where, the superscript + (–) for the coefficient of Δ*RMP* implies that this variable takes the actual value if positive (negative) or equal to zero, otherwise δ_{ni}^{+} and ϕ^{+} (δ_{n-i}^{-} and ϕ^{-}) apply when raw milk prices increase (decrease).

As mentioned above, in order to capture the asymmetries in the short run, $\delta_{hi}^{+} \Delta RMP_{t-i}$ and $\delta_{hi}^{-} \Delta RMP_{t-i}$. (the lagged retail milk price increases and decreases, respectively) $\delta_{ni}^{+} \Delta RWMP_{t-i}$ and $\delta_{ni}^{-} \Delta RWMP_{t-i}$ (the lagged raw milk price increases and decreases, respectively) are used. The asymmetry in the adjustment speed is also checked by defining disequilibrium terms using φ^{-} ($RMP_{t-i} - \beta_0 - \beta_1 RWMP_{t-1}$) and φ^{+} ($RMP_{t-1} - \beta_0 - \beta_1 RWMP_{t-1}$)

The presence of asymmetry can be checked (jointly) by performing a standard Wald test both on the speed and magnitude of the adjustment with following null hypothesis: H_o: $\delta_{hi}^{+}=\delta_{hi}^{-},\delta_{ni}^{+}=,\delta_{ni}^{-}$ and $\varphi^{+} = \varphi^{-}$ *for all* i. Additionally, the asymmetry can also be checked for the adjustment speed (H_o: $\phi^{+}=\phi^{-}$) as well as for the magnitude of the adjustment (H_o: $\delta_{hi}^{+}=\delta_{hi}^{-},\delta_{ni}^{+}=,\delta_{ni}^{-}$ *for all* i) separately.

3.3. Empirical Results

In order to estimate the ECM model, first, the long-run relation as set-out in Equation (1) is estimated. Engle-Granger cointegration test confirms the existence of cointegration relations[4]. Table 4 provides the estimation results on the long-run relation between RMP and RWMP.

Table 4 - *Long-run Relation.*

Dependent variable: RMP		
Variable	***Coeff.***	***Std. Error***
Constant	0.5516	0.0313
RWMP	1.7701	0.0460

[4] Test results are available upon request from the authors.

[5] Test results are available upon request from the authors.

[6] Even though the null hypothesis of symmetry is rejected for the speed parameters (p-value=0.0283), the null hypothesis of the symmetry of magnitudes of adjustment (H_o: $\delta_{hi}^{+}=\delta_{hi}^{-},\delta_{ni}^{+}=,\delta_{ni}^{-}$) is not rejected (p-value=0.6873).

Considering the finding in Section 3.1 that the existence of unit roots is not clear in RMP and RWMP, we also check for the existence of long-run relationship between these variables with Bounds test and found a cointegration relation[5]. By using ARDL approach we also found a similar and significant result: RMP= 0.6095 + 1.6808 RWMP. (Cointegration results are going to be discussed at the end of the section).

Table 5 provides the empirical results on the asymmetric ECM specified in Equation (3). It should be noted that the length of the distributed lag process was determined based on Schwarz Information Criterion.

Table 5 - *Asymmetric ECM.*

Dependent Variable →	ΔRMP	
Independent Variable	***Coeff.***	***Std. Error****
$\Delta RWMP^{-}$	1.2282	0.4520
$\Delta RWMP^{-}_{t-1}$	0.2277	0.3245
ΔRMP^{-}_{t-1}	0.5337	0.1106
$\Delta RWMP^{+}$	0.8101	0.4558
$\Delta RWMP^{+}_{t-1}$	-0.1071	0.2382
ΔRMP^{+}_{t-1}	0.6432	0.1448
$(RMP_{t-1} - \beta_0 - \beta_1 RWMP_{t-1})^{-}$	- 0.2439	0.0493
$(RMP_{t-1} - \beta_0 - \beta_1 RWMP_{t-1})^{+}$	- 0.0942	0.0440

* Newey-West heteroscedasticity and autocorrelation consistent standard errors.

The null hypothesis of symmetry, when jointly testing the speed and magnitude of the adjustment (H_o: $\delta_{hi}^{+}=\delta_{hi}^{-},\delta_{ni}^{+}=,\delta_{ni}^{-}$ and $\varphi^{+} = \varphi^{-}$ *for all* i), is not rejected (p-value=0.8715). However, when separately testing the asymmetry in the adjustment speed the null hypothesis of symmetry (H_o: $\phi^{+} = \phi^{-}$) is rejected, and this implies that there is an empirical evidence on asymmetric pricing[6]. The results from Table 5 implies that the retail price of milk adjusts in roughly 4 months (I1 / -0.2439I) to the price increases in the raw milk but it takes about 10 months (I1 / -0.0942I) for the adjustment in price decreases. Hence, prices at the retail level adjust more slowly to the decreases and more quickly to the increases in milk prices at the farm level in the Turkish liquid milk market. This result is consistent with most of the findings of the earlier studies noted in the introduction.

In order to complete the picture, long-run relationship between retail and raw milk prices are analyzed explicitly by using the co-integration results. The estimation results given in Table 4 points out that 1TL increase in the raw milk prices increases the retail milk prices by 1.77TL in the long run. Since the processors and the retailers incur costs like processing, packaging, distribution, inventories, this figure shows that there is a difference that cannot be explained by the cost formation in the long run. Thus, this result may indicate a significant market power in the milk market. Below, we discuss some possible explanations for the existence of a significant market power and its relation with the empirical evidence on the asymmetry in the adjustment speed as shown above.

4. Market Structure and the Asymmetric Speed of Price Adjustment in the Turkish Liquid Milk Market

The existence of a significant market power in the milk market can be related to the recent transformation of the structure of Turkish dairy market as well as to the peculiar characteristics of the supply chain of the liquid milk.

There has been a major transformation in the Turkish dairy market since the late 2000s, resulting in a high level of concentration and causing concerns over the efficiency of price transmissions. The transformation of the dairy sector in Turkey, in line with the changes in agricultural markets of other countries, turns it to a more market-oriented system. As countries open their markets and reduce the role of the government, the private sector enjoys opportunities for consolidation and concentration. Consolidation can result in highly concentrated markets; erode competition; lead to inefficient markets and higher prices**.** As state control over the markets is removed, private monopolies/oligopolies may replace government monopolies. During this process, centralization and concentration increase and only a handful of firms maintain power over the markets and enjoy the ability to structure the agricultural and food chain. With their dominance on finance, organization, and management due to their large scales, such firms enter both vertical and horizontal integration that enables them to carry large-scale operations which small- and medium-sized farmers, processors and middlemen cannot afford.

These structural changes in the Turkish milk market provide possible explanations for the empirical evidence on the significant market power. Additionally, most of the studies reported in the introduction point to the non-competitive market structures (monopolies/oligopolies) as a main explanation of price asymmetry.

Considering the structure of the supply chain of the liquid milk, there are some additional (and related) possible explanations for the existence of such market power, which are not only correlated with, but also trigger each other. First, milk is a storable product traded in concentrated markets and the results indicate that there is a larger degree of elasticity of transmission for price increase. The main cause of this asymmetry lies in the asymmetric relations shaping the formation of the production chain. Producers keep their raw milk in the cooling tanks, where it stays fresh for only a few days before collection by the processor. Therefore, the producers of raw milk work under contracts and, inevitably, have little bargaining power over the processors. Nevertheless, after the processing stage the milk can stay fresh for several months on the shelves in UHT (Ultra-High Treatment) packets. Second, the gradual integration of food markets makes it difficult for an average raw milk producer to enter goods and input markets and so they face price risk. In order to overcome this risk and guarantee minimum revenue, they enter negotiations including contracts with private firms in the absence of government intervention, where such firms supply credit, inputs, and the know-how to the farmers as well as guaranteed price. By entering such contracts, private firms (processors) directly or indirectly control the production process by manipulating the standards of production, production quantity and quality, resulting in the farmers' loss of sovereignty over production. Third, retailers prefer to work with only a limited number of major suppliers in order to decrease transaction costs, and are able to impose their own standards of quality and quantity. Most producers and processors accept the conditions of the retailers in order to place their goods on the retailers' shelves. These retailers seize the power which originates from their size and ownership of the shelves. The retailers reflect their buying power to the suppliers, and, as such, can inflict extra costs upon them such as list costs, shelf costs, electricity, promotion, and "end of the year" cost (Turkish Competition Authority, 2011:37). In this way, and inevitably, the pressure on the suppliers is transmitted to the producers via prices.

5. Concluding Remarks

The results of this paper support the view that retailers (as well as processors)can exercise significant market power as evidenced by asymmetric price responses in Turkish liquid milk market. Due to the existence of positive price asymmetry in farm-retail price transmission in the liquid milk market, the retail prices adjust more quickly to increases in raw milk price than to decreases implying serious welfare losses to the consumers. This result is also consistent with the empirical evidence of a significant market power in the milk market, which can be related to the recent transformation of the structure of Turkish dairy market as well as to the peculiar characteristics of the supply chain of the liquid milk. More specifically, the main policy insight from this study is that the "liberal transformation" of agricultural markets may create non-competitive environments with only a handful of firms which maintain power over the markets and enjoy the ability to structure the supply chain for their interests at the expense of farmers and consumers.

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