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The Margin Risk and Price Effects in the Turkish Milk Market

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Abstract: An evolution of the margin risks was performed using the relationship between excess price yield, prices of margin and conditional volatility. The analysis was performed with GARCH-M model using 21 years of monthly sale price data. The model parameters were estimated using a maximum likelihood function. The sample period ranged from January 1986 to March 2007. A recursive estimation model was used to obtain a temporary evolution of coefficients in a remuneration scheme for risk (CRR). The results revealed the sensitivity of risk-based cost pricing to retail prices (margin).

Key words: Marketing margin, milk prices, GARCH-M model, volatility

INTRODUCTION

Consumer milk and milk products expenditures can be broken down into their constituent marketing and farm components. Changes in these marketing and farm shares are watched carefully, because they are indicators for trends in costs, profits and services provided by farmers and milk marketing firms. The portion of the consumers' food dollar that goes to milk marketing firms is referred to as the marketing margin.

Consumers encounter two different prices for dairy products, which are the farmer price and the marketing price. These prices reflect the production and marketing costs of milk products and the consumer's desire for the products. Consumers can influence the farmer prices by substituting high service-cost milk products by other low service-cost. From a mathematical standpoint, the marketing margin is the difference between the wholesale price and the farmer price (or the retail price and the wholesale price) of the dairy products. The farm-retail spread is another measure, in addition to wholesale prices, for the marketing margin. It represents payments for all marketing functions that involve assembling, processing, transporting and retailing of products after the products leaves the farm. Changes in farm-retail spreads reflect changes in marketing costs or profits, or both.

The difference between the retail price of milk and the marketing margin is referred to as the farmer's share. This is the portion of the consumer food dollar that farmers receive, expressed as a percentage of consumer's food dollar. There are different methods for measuring the farmer's share that may give somewhat different estimates for this widely quoted statistic (Kohls and Uhl, 1998).

The business of a milk producer/farmer, food manufacturer, or retailer is to increase the retail price to a profitable level. As in any business, certain circumstances may provide favorable profits (Demirbaş *et al*., 2002). Uncertainties about profits for milk producers arise from the variability in the production cost per liter, (which depends on yields) and in milk prices.

Different techniques have been used by producers to reduce risks from production losses. These techniques may include, among others, price estimation, enterprise diversification, different plant designs and operational policies and product insurance (Kim and Harry, 1996). Milk producers also use marketing techniques that can reduce financial risk due to changing prices. Increasing market prices are beneficial, whereas decreasing prices are generally harmful to producers. It is never known with certainty if and when prices will rise or fall (Smith, 2004). Price estimates are useful for establishing a price before or after milking or production. Proper estimation of pricing can protect producers from the impacts of a price decline, but may also hamper potential gains from a price rise. Thus, producers using elaborate price forecasting practices may reduce the adverse financial impacts of price variations.

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Market mechanisms for reducing price risk, such as a futures market, or an options market, do not exist for the Turkish milk market. Risk is the chance that an unfavorable outcome will occur-i.e., the possibility of having prices lower than current prices or milk yields next year falling below average. Because unfavorable outcomes can be financially devastating, risk needs to be managed.

Risk management means defining the potential range of outcomes and taking steps to reduce the chances of an unfavorable one. The goal is not to totally eliminate price risk, just to reduce it, while leaving a chance to benefit from favorable events (Embrechts *et al*., 2002). An acceptable level of risk is usually case-dependent.

Risk tolerance strongly affects management decisions. For example, older that is established producers often choose to avoid risks. They simply do not have time to lay out plans for unexpected events. Then there may be those producers who specialize in the production of milk under risk, holding milk inventories at the top price and giving little consideration to buying insurance (Vaughan and Seifert, 1992). Most producers' behavior lies between these extreme cases, so they carefully analyze all possibilities before making a decision.

The financial condition of the farm/family enterprises is another major factor affecting management decisions. The operation's level of solvency, liquidity and cash flow requirements affect the ability to bear risk. An operation with a high debt/asset ratio, few assets that can be readily converted to cash without taking a loss in value and revenue that just covers cash flow requirements can not afford to take risks. This may be the unfortunate situation for many producers.

Market risk can be managed using strategies that integrate various marketing alternatives and methods (Anonymous, 2005). Marketing alternatives include cash sales, elevator contracts, futures hedges, options and storage. Sales can be initiated with only one of the alternatives.

One marketing method is to distribute sales over prices and time. An example is to distribute sales over those times of the year when prices are normally at their peak. A refinement of spreading sales is to scale-up sales during those times of the year when price peaks are common. Properly anticipating the apex price is impossible and selling on the backside or downside of the market is emotionally very difficult.

Strategies should be specified in a marketing plan. The plan needs to be based on particular price estimation. The plan needs to include price targets and backup plans in case the targeted prices cannot be realized.

Implementation of the plan needs to be flexible enough to accommodate the trend in futures prices as it selects relevant marketing alternatives. A combination of various marketing alternatives can be useful. For example, price changes might be used to establish a price index. The techniques for price estimation help producers make correct decisions in the midst of volatile prices. Evaluation of supply and demand factors in determining the direction and magnitude of price changes is called risk analysis. It is the study of past price behavior to determine where prices are likely to go in the future (Smimou, 2004).

Risk analysis has served to underscore the level of the uncertainty in various markets and observing the situation in a country, it is possible to observe the behavior of certain economic variables and draw conclusions about price instability. Thus do producers, investors, firms and economic associations look for mechanisms to cap risk and guarantee their operations, observations and premises for prediction fertilize strategic actions to manage risk that can themselves affect the market (Hatirli *et al*., 2004).

It is becoming considerably more important to streamline market conditions to the international standards represented by the EU, which is the largest producer and the strongest stakeholder in the commercialization and development of internationally traded milk (Kiymaz, 2000). It is important to use common assumptions about future trends in price based on estimation models that appreciate not only price history, but who the powerful players in the market are and how their planning may affect the whole market. Finding a model that can closely simulate reality can provide the opportunity to define which risk management behavior best fits the risk associated with a particular market.

Here, milk price risk will be quantified using an invariance approach GARCH-M model where risk is assigned value based on volatile prices conditional on the excess of margin yield (Giot and Laurent, 2004). This approach allows the decomposition of the price of risk from the affected retailer margin. A procedure for recursive estimation of coefficients of the GARCH-M model will be introduced (Castellanos and Beltrán, 2001). Thus, we allow for the possibility that coefficients vary over time and consider that any study of temporary evolution in prices can be adjusted due to a structural change in the preferences of individuals, or due to changes in the formation of expectations as they evolve in a learning process.

DATA AND ECONOMETRIC METHODOLOGY

Models 1, 2 and 3 are made a test an econometrically by profit software program. Econometric and statistical

results matched economic expectations. After testing these 2 models, the effect of prices on margin risk was analyzed.

In this study, monthly data from January 1986 to March 2007 were used to determine Wholesale Margin (WM), Retail Margin (RM) and other related prices. The original data was obtained from TURKSTAT (the Turkish National Statistics Office) and adjusted by removing the seasonal effects.

The margin risk model is a GARCH-M (1, 1) model of heterokedastic conditional variance, with no null conditional average. The model relates the price yield and risk based on the following expression (Jiménez and Rodríguez, 2004):

$$M_t = \delta h_t + \varepsilon_t \quad (1)$$

where, M_t is the price margin across the farm-to-retail chain, h_t is the square root of h^2_t, the heterokedasticity variance in the current time to the information available in t-1 and ε_t a prediction error distributed N (0, h_t^2).

WM_t is defined as an excess price yield at the wholesale level through the following form:

$$WM_t = PF_{2,t-1} + PW_t - PW_{t-1} - PF_{1,t-1} \quad (2)$$

[estimable model MUST have: parameters designating coefficients of estimation and an error term!].

where, WM_t is the wholesale margin at time t and $PF_{2, t-1}$ and $PF_{1, t-1}$ are 2 farmer prices associated with risk and managerial changes, while in parallel, PW_t minus PW_{t-1} is the change in the wholesale price expressed logarithmically. Estimating the coefficients on these variables using OLS yields the following results:

WM_t =	-0.77519 +	0.29372 $PF_{2,t-1}$ +	5.1005 PW_t	-0.61850 PW_{t-1}	-5.4197 $PF_{1,t-1}$
	(0.10983)	(0.028349)	(0.12550)	(0.021718)	(0.35368)
t =	-7.0583	10.3607	40.6411	-28.4793	-15.3240
R^2 = 0.87642		F = 441.4726		d = 2.0112	

The numbers in the first set of parentheses represent the estimated standard errors of the partial regression coefficients immediately above them. The numbers in the row below the standard errors are the corresponding t-values. Statistical analysis of model 2 reveals that all estimated regression coefficients are individually statistically significant at the 5% level of significance and each of the computed t-value exceeds the critical value. Thus, the null hypothesis may be rejected, suggesting that the true population value of the relevant coefficient is zero. The probability values indicate that all partial regression coefficients are statistically significant.

At the 5% level of significance, the critical F value for 4 and 249 DF. $F_{0,05}$ (4, 249) is 2.37. Obviously, the computed F value is significant and hence the null hypothesis may be rejected.

The R^2 value of 0.87642 shows that the four explanatory variables accounted for more than 87% of the variation in wholesale margin is in Turkey over the period of 1986-2007.

It was further assumed that the null hypothesis is $\rho = 0$ and the alternative hypothesis is $\rho > 0$. The Durbin-Watson test for autocorrelation revealed there is no definite evidence of autocorrelation. At the 5% level of significance, the critical d values are d_L = 1.728 and d_U = 1.810 for 254 observations and 4 explanatory variables and the computed d value of 2.0112 is higher than d_L and d_U.

In order to test the model performance, data was acquired from TURKSAT for the period of 1986-2007. The data was fitted to the wholesale margin and retail margin variables by the method of Ordinary Least Squares (OLS). The following regression model was obtained:

$$RM_t = PW_{2,t-1} + PR_t - PR_{t-1} - PW_{1,t-1} \quad (3)$$

where, $PW_{2, t-1}$ and $PW_{1, t-1}$ are 2 types of wholesale prices associated with risk and managerial changes and PR_t minus PR_{t-1} is a change in the retail price expressed logarithmically. Estimating the coefficients in these variables using OLS yields the following results:

RM_t =	1.5480 +	1.2445$PW_{2,t-1}$ +	3.6109PR_t	-0.82257PR_{t-1}	-8.0397$PW_{1,t-1}$
	(0.43732)	(0.17119)	(0.26387)	(0.078967)	(1.0471)
t =	(3.5398)	(7.2697)	(13.6843)	(-10.4166)	(-7.6781)
R^2	= 0.44030	F = 48.9712		d = 2.0645	

The numbers in the first set of parentheses represent the estimated standard errors of the partial regression coefficients. The numbers in the second set of parentheses are the estimated t-values. As for the statistical significance of the estimated coefficients, the Model 3 reveals that all estimated coefficients are individually statistically significant at the 5% of level of significance: The ratios of the estimated coefficients to their standard errors (t ratios) are 3.5398, 7.2697, 13.6843, -10.4166 and -7.6781, respectively. Each of the computed t value exceeds the critical value. Hence, individually the null hypothesis may be rejected, suggesting that the true population value of the relevant coefficient is zero. The probability values indicate that all partial regression coefficients are statistically significant.

At the 5% level of significance, the critical F value for 4 and 249 df. $F_{0,05}$ (4, 249) is 2.37. Clearly, the computed

F-value is significant and hence the null hypothesis may be rejected. The computed F still exceeds this critical value by a large margin.

The R^2 value of 0.44030 shows that the four explanatory variables accounted for over 44% of the variation is in retail margin in Turkey over the period 1986-2007.

It was further assumed that the null hypothesis is $\rho = 0$ and the alternative hypothesis is $\rho>0$. At the 5% level of significance, the critical d values are $d_L = 1.728$ and $d_U = 1.810$ for the 254 observations and 4 explanatory variables. Since, the computed d value of 2.0645 is higher than d_L and d_U, the null and alternative hypothesis can not be rejected. There is no definite evidence of autocorrelation (Gujarati, 1995).

In this study, risk is defined through the equation of proposed conditional volatility from a GARCH (1, 1)-M model:

$$h_t^2 = \varpi + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1}^2 \quad (4)$$

where, the sign of the coefficients must be strictly positive, that is $\varpi>0$, $\alpha>0$ and $\beta>0$.

The parameter values for the 4 models (1) and (4) were estimated using the Maxima probability and an algorithm from K´arn´y and Kulhav´y (1988). The conditional distribution of the errors used is the generalized exponential distribution (GED). Because many empirical relations have shown that the standardized remainders generally used to find distributions are leptokurtic and in some cases asymmetric (Nelson, 1991). The density GED function may also include distributions with heavier and thinner tails than the normal distribution and delineates these using the following method, which is case-dependent.

The GED density function works as follows:

$$f_v(\varepsilon t/\psi t\text{-}1) = v\left[\lambda 2^{\left(1+\frac{1}{v}\right)}\Gamma\left(\frac{1}{v}\right)ht\right]^{-1}$$
$$\exp\left[-\frac{1}{2}\left|\varepsilon_t \lambda^{-1} h_t^{-1}\right|^v\right], \quad (5)$$
$$\lambda = \left[2^{-\frac{2}{v}}\Gamma\left(\frac{1}{v}\right)/\Gamma\left(\frac{3}{v}\right)\right]^{-\frac{1}{2}}$$

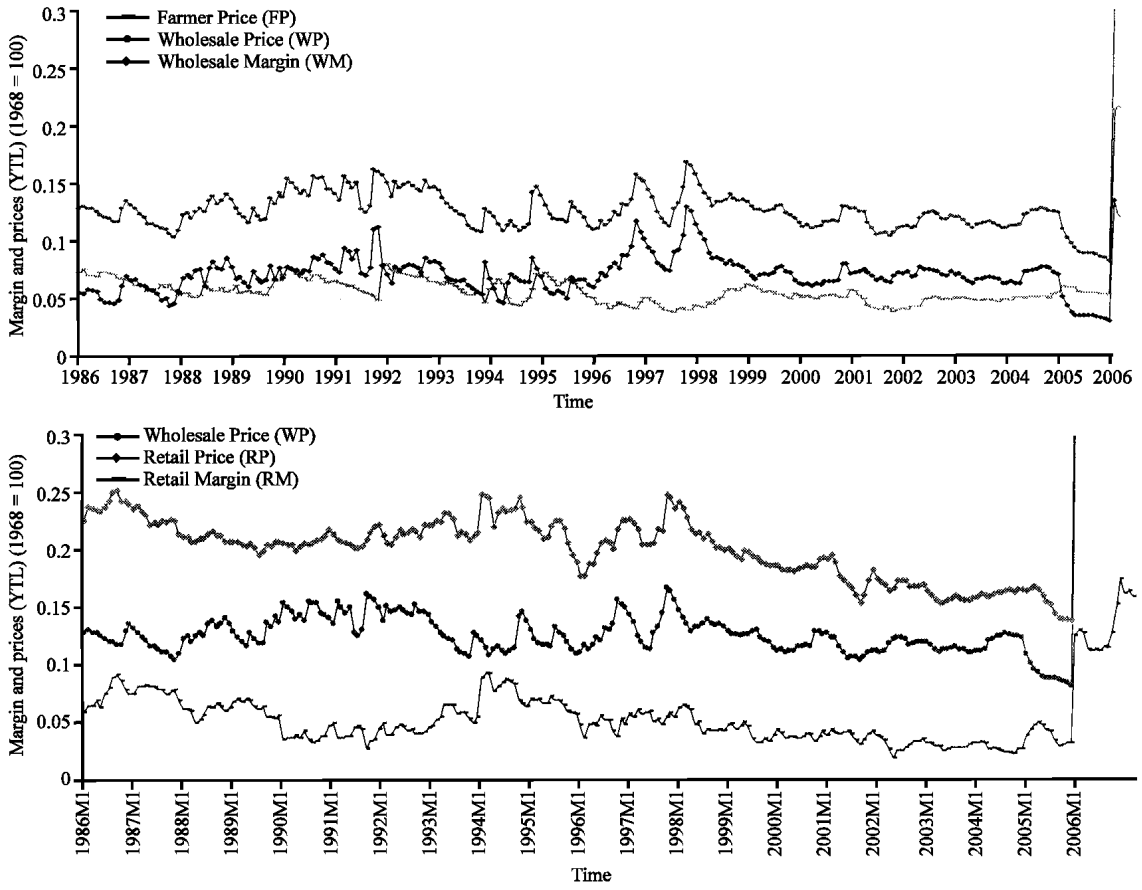

Fig. 1: Temporal variations in margin and prices

Here, v is a scaling factor. For v = 2, the GED distribution for the standardized $z_t = \varepsilon_t/h_t$ remainder tends to normal, whereas for v<2, the density of $z_t = \varepsilon_t/h_t$ is more pointed and has longer tails than the standard normal distribution.

If v = 2, PW_t and PR_t represent the changes in the price with respect to margin, expressed in logarithmic scale; P_t is the type of monthly price, where t = 1, 2. From these initial data, the following variables have been generated: M_t is the type of monthly margin, for t = 1,2; M_t is the price over margin in the milk market, defined as the evolution of the type of changes in price and this can be observed in Fig. 1. In this figure, a noticeable depreciation in the type of change from the margin can be observed, based on changes in behavior. From January 1986, the Wholesale Margin (WM) has been changing relative to FP (Farmer Price) and WP (Wholesale Price). As for the Retail Margin (RM), it exhibits a decreasing trend. On the other hand, as far as the excess exchange yield of margin, increases in price dispersion was perceived after the constitution prices was established, which support the hypothesis of decreasing volatility. Furthermore, the results of diverse resistances on the excess margin yield, indicate the stationary of the same one. In addition, the presence of conditional volatility, that would justify the use of a GARCH model, was detected. For example, the excess of yield of prices displays yearly structure in the periodic report, whereas its square displays a significant autocorrelations. In addition, the series is leptokurtic and slightly asymmetric towards the left. These facts are indicative of the existence of conditional volatility.

ESTIMATION OF THE COEFFICIENT OF REMUNERATION TO RISK-TAKING

Coefficient of Remuneration of Risk (CRR) and Conditional Volatility (CV) are essential for the construction of margin premium risks. This epigraph is to the results of the joint estimate of the model GARCH (1, 1)-M for the prices defined by Eq. 1. We will first comment on the estimation of the CRR for all prices and the margin before and after the introduction of the price. Next, we comment on the results from the recursive estimation of the CRR to analyze the temporary evolution of the CV. The estimations of CRR for a particular period in the Turkish Milk Market (TMM) appear in Table 1. The table displays the estimated coefficients of the GARCH (1, 1)-M model and the logarithm of the probability function and the meaning of the null hypothesis v = 2 (for a conditional normal distribution), as opposed to the alternative hypothesis H1: v<2.

According to the results in Table 1, the following conclusions may be drawn:

- All coefficients considered for the joint periods of the TMM are significant at the 5% level (except the intercept ϖ). Specially, CRR (ϖ) is statistically significant like the coefficients of the GARCH model. In addition, these results are valid, because the conditional variance is stationary and the model specification ($\alpha_1 + \beta_1 < 1$ is correct).
- The null hypothesis that the distribution of the error is conditional normal can be rejected by the evaluation of the null hypothesis, H_0: v = 2 the logarithmic probability distribution of GED.
- The temporary evolution of the risk premium considered for Margin of RM and WM displayed a stationary behavior presenting a greater variability in RM. Figure 2 shows the evolution of the risk premium. According to this figure, the changes in the behavior between two consecutive periods to the prices of entrance, that is being observed a clear increase of the same one as of year 2004 and 2006. This result seems to contribute excellent information about the evolution of the excess yield changes to margin, because an increase in the risk premium is appraised in the last months of the sample case. However, the variations in the premium can not be related to precise economic events, given that the study was conducted for a relatively stable period of the global the agricultural economy. But perhaps further study may demonstrate whether this greater volatility in PME (Retail Margin Volatility) and PME can be described as a depreciation of the retail margin.
- One of the main objectives of this type of GARCH analyses is to determine if the future price estimates accurately reflects market conditions and ensures the possession of an effective cover. Based on Statistical Unstandardized Residual Movement, it could be concluded that prognosis was predicted correctly. Several diagnostics tests were reported in Table 2. The skewness of a normal distribution is zero and any symmetric data should have skewness of or near zero. Table 2 reveals that the skewness of WM is near zero, but the skewness of RM is 5.588.

In Fig. 3, the histogram of RM is a sample distribution from a normal distribution. The normal distribution is a symmetric distribution with well-behaved tails, which is captured by the skewness of 5.588. The kurtosis of 61.892 is near the expected value of 62. Based on these measures, the histogram is symmetric. The second histogram

Table 1: Maximum likelihood estimates for the excess yield of the Margin with regard to the prices for the model GARCH (1, 1) - M and the probability density function of the error GED

	Wholesale Margin (WM)				Retail Margin (RM)			
	Coefficient	Standard error	T-Ratio	p-value	Coefficient	Standard error	T-Ratio	p-value
δ	0.003	0.001	3.039	0.003	0.0010	0.003	3.696	0.000
ϖ	0.1229E-3	0.0071235	0.017253	0.986	0.3662E-3	0.010021	0.036545	0.971
α	0.81001	0.062612	12.9370	0.000	0.61911	0.062685	2.2821	0.023
β	0.16603	0.062618	2.6515	0.009	0.33698	0.062670	5.3770	0.000
ν	1.249			0.0012	1.251			0.017
LOG L	167.34				107.76			
H_0: ν = 2				0.000				0.000

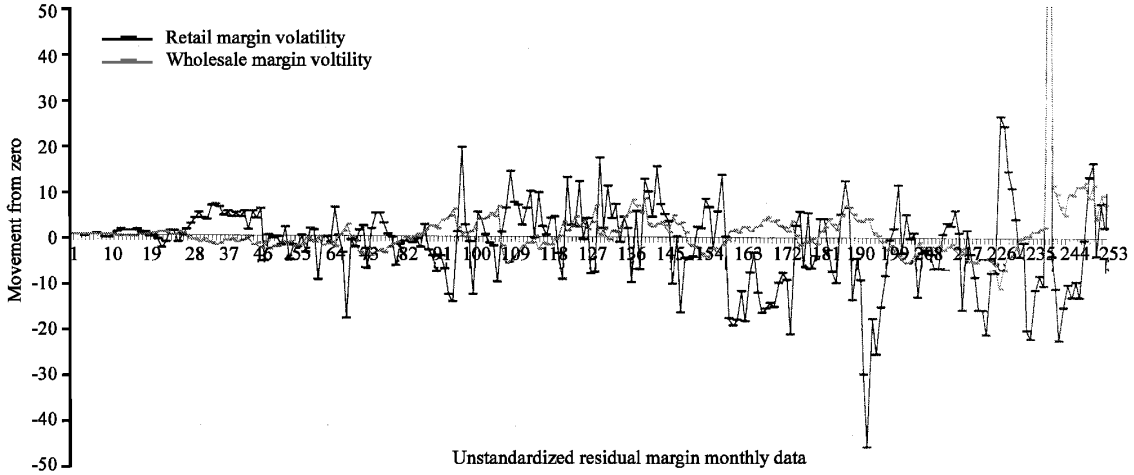

Fig. 2: Evolution of the risk premium for the excess margin yield with respect to the prices, assuming that δ is constant, in the GARH (1, 1)-M-GED model

belongs to WM. The values of skewness and kurtosis of the WM histogram indicates that the distribution is right-skewed (Mardia, 1970).

Considering the prognosis statistics in Table 2, the behavior apparently is normal, however the kurtosis and skewness are high relative to the normal one, being leptokurtic and indicating that several values are around the average. In any case, the behavior apparently can be approximated as normal. A histogram of the Statistics for Unstandardized Residual Movement is shown below Fig. 2.

- Finally, CRR was found to be high in the RM, which is consistent with the results discussed above. This conclusion can be separately drawn by comparing the results from the GARCH-M model with the WM. However, the results indicated that the CRR was statistically significant to the 5% of meaning level. However, coefficients in both variables (RM and WM) are not statistically significant, nor do they meet the sign restrictions. Hence, this result should be used with caution. In order to support this result, a recursive study of the CRR may contribute information to enrich the results.

Table 2: According to the WM and RM, unstandardized residual statistics values

	WM	RM
Mean	0.0000000	0.0000000
Median	0.0006560	-0.0031761
Mode	-0.20435	-0.05965
S.D.	0.05375169	0.03658921
Variance	0.00288924	0.00133877
Skewness	0.227	5.588
Std. Error of Skewness	0.153	0.153
Kurtosis	1.081	61.892
Std. Error of Kurtosis	0.304	0.304
Range	0.36873	0.47040
Minimum	-0.20435	-0.05965
Maximum	0.16438	0.41075

Several diagnostics tests were reported in Table 2. The skewness of a normal distribution is zero and any symmetric data should have skewness of near zero. Table 2 reveals that, the skewness of WM is near zero, but the skewness of RM is 5.588.

In Fig. 3, the histogram of RM is a sample distribution from a normal distribution. The normal distribution is a symmetric distribution with well-behaved tails, which is captured by the skewness of 5.588. The kurtosis of 61.892 is near the expected value of 62. Based on these measures, the histogram is symmetric. The second histogram

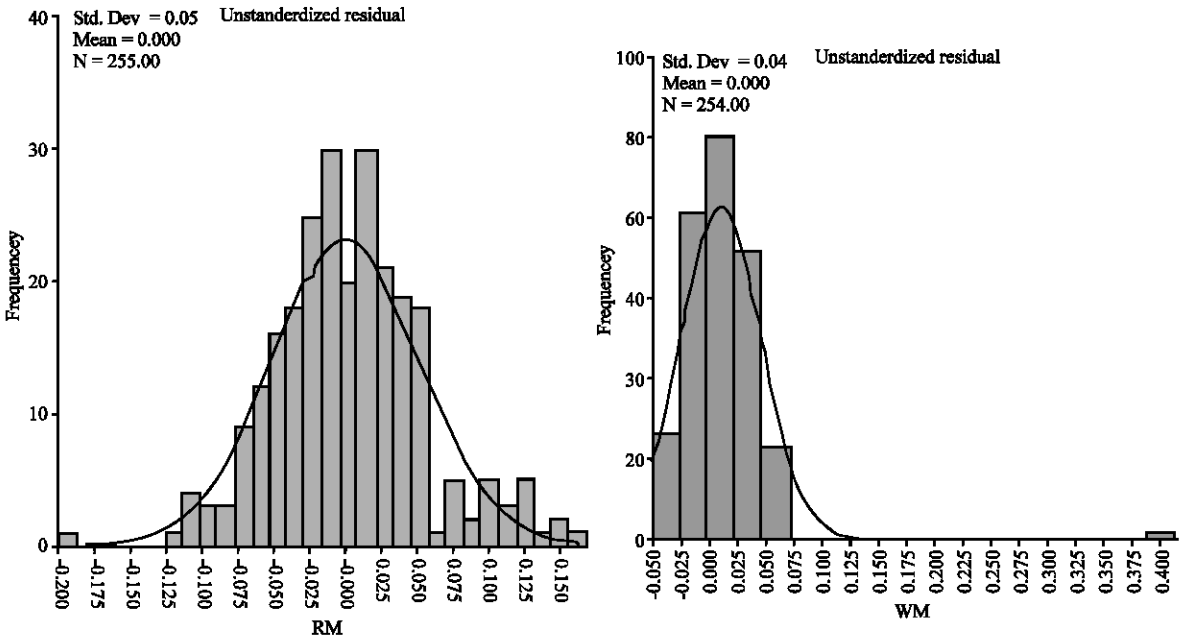

Fig. 3: According to the RM and WM, Unstandardized Residual Histograms

belongs to WM. The values of skewness and kurtosis of WM indicate that the distribution is right-skewed (Mardia, 1970).

RECURSIVE ESTIMATION OF CRR (CV)

A recursive procedure that updates the parameter estimates was designed to analyze whether the remuneration coefficients of risk varies over time (CV). The recursive method is based on a recursive adaptation method developed by Engle (1982) and is reasonable since the maximization of the sample probability is a learning form.

A general expression for the model considered for the excess yield can be written as:

$WM_t = \delta h_t + \varepsilon_t$ WM = 255 WM (wholesale magrin) risk
$RM_t = \delta h_t + \varepsilon_t$ RM = 255 RM (retail magrin) risk

where, $h_t^2 = \varpi + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1}^2$ is the conditional volatility of type GARCH (1, 1). The original sample consists of 255 observations. This is the first sample in which estimation contains information about the sample period from the January 1986 to March 2007 period (N = 255). Under this general concept, the algorithm is used to estimate the following parameters of interest (Bernd *et al*., 1974).

The individual resistance term of the parameters is also estimated recursively. In Fig. 4, the evolution of the CV and the associated student's t-statistics are the same, corresponding to the GARCH (1, 1)-M model under GED. MEW (Wholesale Margin Error Volatility) and MEP (Retail Margin Error Volatility), in which the intervals of inferior and superior confidence of the CV considered for a level of confidence of the 95%. An important conclusion on the evolution of the CV is that the behavior differs between variables. As for the statistical behavior or trend of this coefficient in time, it increases to the input of prices. This fact can be interpreted like a symptom of certain instability produced by the entrance of prices, because a greater price of risk is associated with greater volatility and hence, with a greater premium. In addition, such a high risk could be associated with a big loss. The results seem to support the hypothesis that clearly a change in the margin risk behavior with respect to the current prices and that this change agrees well with the implantation of prices, unlike the expectations created by the agents during the period analyzed.

In Turkey, price adjustments based on financial stability and economic theories result in increased price risks when compared to margin prices. Theorize by surroundings of economic and financial stability at Turkey's level the implantation of prices would lead to an increase in the price risk as compared to the margin price. The risk premium is defined as the product of the risk price and its conditional volatility. Thus, an increasing trend in the risk premium is largely due to the increasing trend in the risk price.

The underlying reasons for the high volatility should be elaborated. First of all, after 2005, a computational error

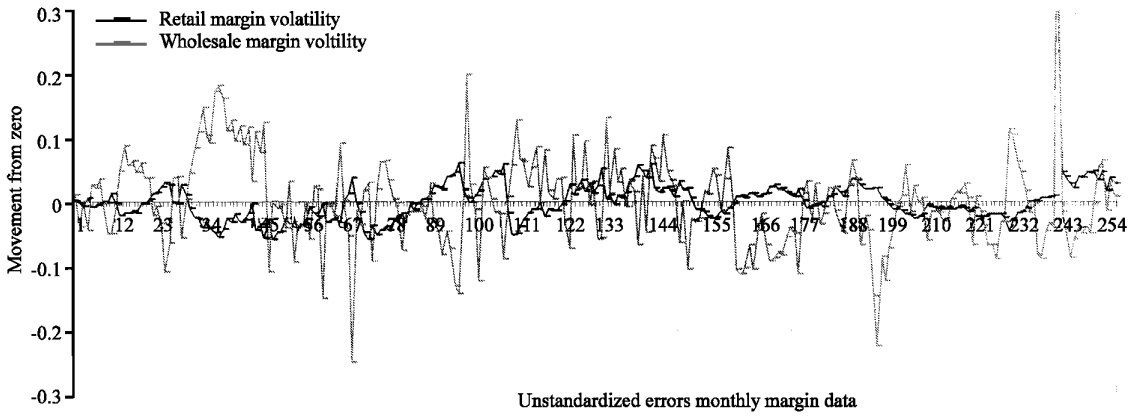

Fig. 4: CV and student t-statistic, estimation GARCH (1, 1)-M and distribution GED for the errors

associated with the expectation of growth in the region took place that led to high agricultural growth in Turkey. High agricultural growth affected the margin currency, resulting in a phase of depreciation and great instability in prices. Second, as of March of 1995, a continued increase in retail milk prices affected by the privatization of this raw material caused increasing price risk in Turkey. As a result of such price instability, Turkish farmers were forced to follow government policies and hence, retail milk prices increased on several occasions according to official schedules. Meanwhile, retail milk prices experienced a phase of depreciation that continued, due to structural factors.

Turkish milk market does not have any explicit mandate to obtain stability of the types of changes that is arranged to take part in situations critics. Thirdly, the flow of strong milk industry investment in the Turkish economy is another crucial factor. Creation of great Turkish milk markets has allowed to the positioning of high discharge of debt titles that has been subsequently used to acquire foreign companies. These flows initially preceded a weakening margin price. Finally the introduction of a new currency resulted in high market uncertainty and price risk increased more than the margin prices in the milk market.

CONCLUSION

A data set from January 1986 to March 2007 was used to analyze the Wholesale Margin (WM), Retail Margin (RM) and the other related data in the Turkish milk market. The original data were obtained from TURKSTAT (National Statistics Office in TURKEY) and were modified by removing seasonal effects. The GARCH-M (1, 1) model was used in analyses and formulated a test with econometric models.

The margin was calculated as a difference from the price in the Turkish milk market. The base year for the price and the margin was taken for 1986. The analysis was allowed to focus on the strength or weakness of the Turkish currency ahead of the margin through the analysis of margin risk. The results showed that evidence for an increase of the margin risk negatively changed the prices and the margin. The estimates of the CRR were significant and positive. This estimate indicated that the risk premium showed high dispersion prices. However, the recursive estimates of CRR (CV) existed to a clear decrease of this one whereas a slightly increasing trend in the milk markets were observed, which was statistically significant. This evidence would show the weakness of the Turkish currency in comparison to the margin process.

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