Analyzing CBRT's FOREX interventions using EGARCH (2001-2006)

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ANALYZING CBRT'S FOREX INTERVENTIONS USING EGARCH (2001-2006)

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Özet

2001 sonrası Türkiye ekonomisi politika yapıcılar tarafından yaşanan ekonomik krizin etkilerini bertaraf etmeyi ve ekonomiye istikrar kazandırmayı amaçlayan pek çok ekonomi politik önlemine sahne olmuştur. Özellikle para politikası açısından, başlıca parasal göstergelerdeki oynaklığa karşı müdahale etmek amacıyla yürürlüğe konan önlemler daha çok döviz piyasasında yaşanan aşırı oynaklığı gidermek amacıyla uygulanmıştır. Çalışmamızda, Türkiye ekonomisinde uygulanan bu tür politikaların etkinlik derecesi incelenmeye çalışılmış ve politika uygulama sürecinde bakışımsız (asimetrik) beklenti oluşum süreçlerine izin veren EGARCH tahmin yöntemi kullanılarak elde edilen tahmin sonuçları, satın alma yönünde gerçekleştirilen ve 2006 yılının ilk yarısını da kapsayacak şekilde döviz piyasasında uygulanan müdahalelerin bu anlamda etkin olmadığını ve daha çok rezerv birikimi amacıyla gerçekleştirildiğini, buna karşılık kriz sonrası satım yönünde gerçekleştirilen müdahalelerin büyük ölçüde para otoritesi tarafından ilan edildiği şekliyle de uyum içerisinde olmak üzere, bu amaca ulaştığını ortaya koymaktadır.

Anahtar Kelimeler: Döviz Piyasası, Müdahale, EGARCH Modelleri, Türkiye Ekonomisi

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Abstract

The post-2001 period in the Turkish economy witnessed many stabilization efforts and regulations applied by policy makers so as to eliminate the effects of the economic crisis on the economy. Dealing with the monetary policy, these policies were conducted in favor of just-in-time interventions when the volatilities in some main monetary aggregates were occurred, and foreign exchange rate market (FOREX) interventions constituted a great deal of such kind of policies. In order to examine such policy issues implemented in the Turkish economy, we try to estimate in our paper how effective were these policies, and our *ex-post* estimation results permitting asymmetries in policy implementation process using EGARCH estimation method of the contemporaneous econometrics reveal that these policies seem not to be effective in reducing volatilities occurred in the FX market but in accumulating reserves through purchase auctions implemented up to the very recent times of the mid-2006, although the just-after crisis interventions in the form of sale auctions, to the great extent, give support to the declared role of monetary authority in this sense.

Key Words: Foreign Exchange Market, Intervention, EGARCH Models, Turkish Economy

I. INTRODUCTION

The Turkish economy witnessed a highly devastating crisis in 2001 both on the real income generation process and on the financial markets which were subject to a great deal of volatility. Following the crisis conditions and dealing with the implementation of monetary and exchange rate policy, the officials of the Central Bank of the Republic of Turkey (CBRT) announced that in conducting the monetary policy the primary goal would be to smooth out

the volatilities in these markets, and so intervention policies would be decided on the basis of limiting excessive volatility, or not to follow some strict targets upon the current levels of financial indicators. Indeed, the latter type of policies might lead to some unacceptable *ex-post* policy realizations, given the huge level of debt stock for government and strong sensitivity of financial indicators to domestic interest structure of the economy. Thus, the conduct of monetary policy canalized into a partially accommodative policy stance in the sense that no policy choices increasing the riskiness of domestic borrowing and the risk premium in financial markets could be accepted.[1]

In line with the determination of such a policy stance, a great deal of concern for the post-2001 period has been given to the exchange rate policy in the floating exchange rate system by policy makers, and in an economics policy perspective, monetary policy has evaluated through stabilizing the money markets by applying to active intervention policies. In this paper, our aim is to shed some light upon these policy interventions for the post-crisis period, and to examine whether these policies are effective in obtaining the *ex-ante* specified targets inside the investigation period beginning just after the 2001 crisis period till the mid-2006. For this purpose, the outline of the paper is as follows. The next section is devoted to the immediate policy developments for the post-crisis period and to the recent policy proposals advocated by the CBRT for the late-2005 and early-2006, using official reports published by the CBRT in order to bring out the *ex-ante* expectations dealing with such policy interventions. The third section interests in data issues and model specification and also estimates an empirical model for the Turkish economy in the light of some contemporaneous literature review, while the final section concludes.

II. POLICY DEVELOPMENTS FOR THE POST-CRISIS PERIOD

As of the beginning of floating exchange rate system, the CBRT designed its monetary policy in order to cease the problems in the payments system and to maintain stability in the financial markets. Within this framework, the CBRT provided the required liquidity through quotations and open market operations in the form of direct purchases and by supplying the Turkish lira at the interbank money market. In order to bring functionality to the banking system and to end the bottleneck at the payments system, the CBRT actively intervened in the markets, lowered the short term interest rates, and implemented policies to provide the efficient allocation of the liquidity in the system. The maturity of the overdue repos of the state banks and the banks under the Saving Deposits Insurance Fund (SDIF) was renewed so that the pressure of these banks to the system was depressed (CBRT, 2001: 19). Besides, some ceiling values to the net domestic assets and the base money items of the CBRT balance sheet and floor values to the changes that can periodically be realized in the net international reserves had been set. But, as a difference from a strict monetary targeting framework, the restriction on the base money was not a performance criterion but an indicative ceiling value (CBRT, 2001: 3), since the crisis environment and rapid structural changes in financial markets led to structural changes in the money demand and base money estimations. This policy framework has been aimed to be carried on until the prerequisites for inflation targeting regime would be met (CBRT, 2002a: 18). Also, in order to rehabilitate the financial structure of the state banks and fund banks, the Treasury provided new T-bills to these banks, of which a considerable amount was purchased directly by the CBRT. This liquidity enabled the state banks and fund banks to close their overnight borrowing to other banks and to their customers. The excess liquidity due to this transaction as well as the liquidity expansion due to the use of external financing provided from the IMF in the domestic financing was

withdrawn by the CBRT through foreign exchange (FX) sales, reverse repo and interbank transactions. The effect of domestic credit expansion on monetization as a result of these operations was controlled by the CBRT, maintaining the base money as predicted by the program, and thus limiting its inflationary consequences (CBRT, 2001: 19-21).

In this policy framework, the exchange rate policy was based on the principle of the determination of exchange rate according to the supply and demand conditions in the market. Interventions to the foreign exchange would be limited, and the CBRT would intervene in the foreign exchange market in order to prevent excessive fluctuations. If required, the CBRT would use transparent methods destined to increasing foreign exchange reserves in compliance with the floating exchange rate system without distorting the long term trend of exchange rate and its natural equilibrium point. In this respect, while the CBRT conducted regular auctions of sale of foreign exchange in order to smooth the effects of short term temporary exchange rate fluctuations without affecting the long run equilibrium level, and to sterilize the excess liquidity in the market caused by the use of external financing in the very early phases of the program throughout 2001 (CBRT, 2001: 24), subsequent phases witnessed FX purchase auctions to accumulate reserves and to strengthen the confidence in the markets in the medium and long run (CBRT, 2002a: 19).

Also, in the aftermath of the February 2001 crisis, short term interest rates had been used to provide price stability and determined by considering the developments in inflation and the developments in the macroeconomic variables affecting future inflation. Thus, the CBRT would cut its short term interest rates considering the developments in the domestic economy, such as appreciation of the Turkish lira, absence of a revival of the domestic demand that might have a boosting effect on inflation, public price movements in accord with the year-end

inflation target, the convergence of inflation expectations towards the year-end target, and decreasing of volatilies in financial markets (CBRT, 2002b: 25; CBRT, 2002c: 20-21). Naturally, the reverse developments to those considered above would lead the CBRT to implement different policies in the conduct of monetary policy.

In line with these issues, the CBRT recently announced that monetary policies have been implemented in the light of the purpose of price stability by the second half of 2005 and early-2006. Developments in capital, money and exchange rate markets as well as developments in aggregate supply – demand equilibrium, productivity, employment, unit-wage costs, public and private sector pricing behaviour and also changes in inflation expectations and some risk considerations led by exogeneous shocks in international markets would be considered in implementing the monetary policy (CBRT, 2005a: 27-30; CBRT, 2005b: 25-27). Thus a highly endogenous characteristic at least in the *ex-ante* formation process of policies and expectations would be imposed by the CBRT to have a dominant role in policy implementation process. In addition, as expressed above, the CBRT chose the short term interest rates for the basic policy tool, instead of using monetary aggregates as an anchor endogeneously determined by money demand which is subject to breaks and instabilities, and expected that decisions on short term interest rates would affect inflation *via* long term interest rates and through investment and consumption decisions and pricing behaviour, that were mainly shaped by the amounts of loans, exchange rates and expectations. Meantime, the CBRT continued interventions and daily foreign exchange (buying) auctions conducted for pre-announced reserve build-up purposes inside the whole period (CBRT, 2006a: 38), and this process helped also increase the excess liquidity in financial markets which in turn led to rise in domestic demand supported by the resurrection in domestic credit volume especially through residential-housing sector (CBRT, 2006b: 39-41).

III. DO THE CBRT'S INTERVENTIONS AFFECT VOLATILIY?

Through these policy proposals and realizations, as of the early phases of the post-2001 crisis period, the CBRT has been applying to some intervention policies in foreign exchange market. By the very early phases of the post-2001 free floating regime, all interventions tend to be in the form of sale interventions. In this period, the total of foreign exchange sale interventions which were all in 2001 between 29/03/2001 and 30/11/2001 was US$ 6553 million. Beginning in April 2002 up to very recent times of the May 2006, all interventions have been in the form of buying interventions.[2] The first part of those was implemented between 01/04/202 and 27/06/2002, and US$ 795 million was bought back by the CBRT. The second part was between 06/05/2003 and 22/10/2003, and the total amount bought back by the CBRT was US$ 5652.3 million. Also in 2004 and by the first quarter of 2005, the foreign exchange market witnessed two other episodes of buying interventions. The first one running from 23/01/2004 till 26/04/2004 summed up to US$ 3782.4 million, while the other running perpetually from 22/12/2004 till 15/05/2006 of the end of our investigation period in this paper summed up to US$ 11001.7 million. Thus, as of the beginning of free floating period, the total amount bought back by the CBRT through foreign exchange interventions is US$ 21231.4 million. We should specify that, by following Akıncı et al. (2005a), the CBRT policy makers have two main channels to intervene in the foreign exchange market: pre-announced auctions, leaving no room for a surprise for the market agents, and the interventions. In this paper, our focus inclines upon the auctions using the data taken from the electronic data delivery system of the CBRT. Having examined briefly both the course of monetary policy stance of the CBRT and the intervention policies for the post-2001 period, we now try to examine the effectiveness of the CBRT's foreign exchange (FOREX) interventions. For this purpose, by following Domaç and Mendoza (2004), we will apply to the exponential

generalized autoregressive conditional heteroskedasticity or EGARCH model proposed by Nelson (1991: 347-370) in order to reveal the effects of such interventions on the level and volatility of exchange rate return. Our time series representation using daily data begins from 23/02/2001 till 15/05/2006 with 1302 business days.[3]

The variables used are the TL/US$ exchange rate return in log difference (DLNDOLLAR), the daily total amount sold by the CBRT in US$ selling auctions in millons of US$ expressed in negative magnitudes (SELLING2), the daily total amount bought by the CBRT in US$ buying auctions in millions of US$ (BUYING), and the change in central bank overnight interest rates (DINTEREST) as a policy variable to account for the effect of intervention in the money market. Using a preliminary investigation not reported here, we have found that all the variables considered are stationary. Also a short glance to Figure 1 points out that all the variables have stationary characteristics:

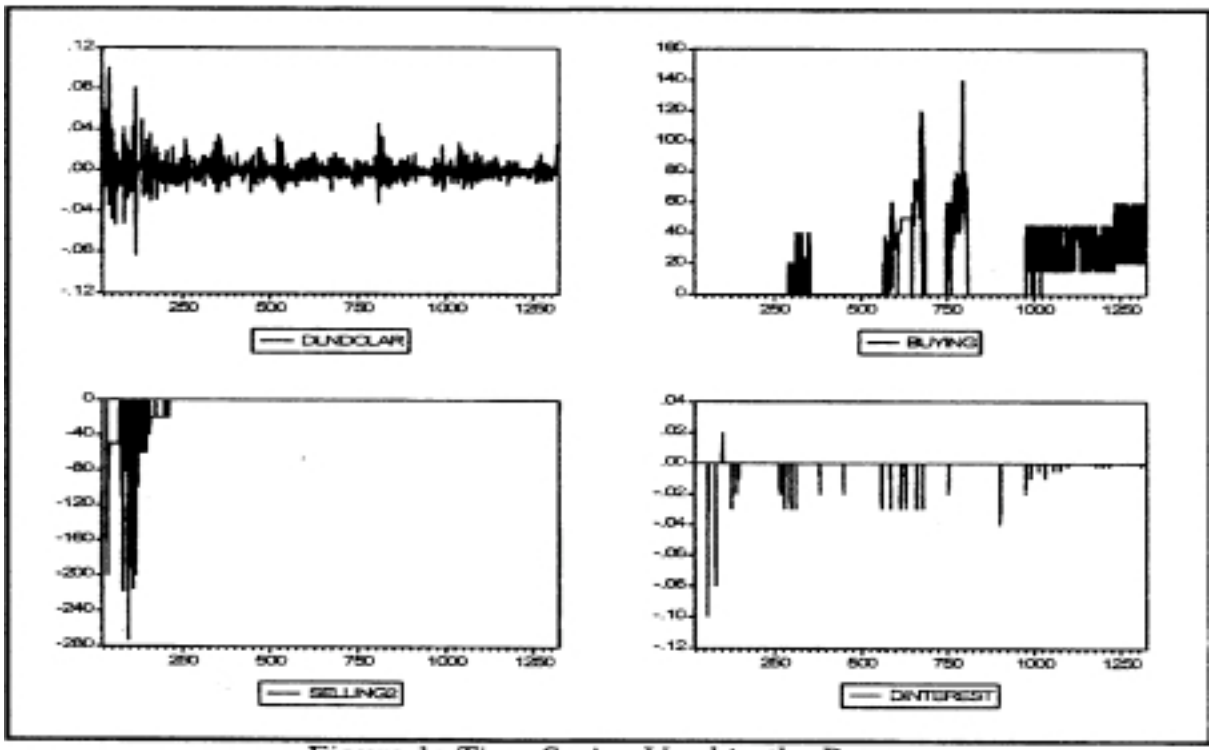

Figure 1: *Time Series Used in the Paper*

Dealing with the econometric methodology used in this paper and following QMS (2004: 596-604), the specification for the conditional variance in EGARCH model is:

$$\log(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j \log(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left| (\varepsilon_{t-i}) / (\sigma_{t-i}) \right| + \sum_{k=1}^{r} \gamma_k [(\varepsilon_{t-k}) / (\sigma_{t-k})] \qquad (1)$$

for which the left-hand side is the log of the conditional variance. This implies that the leverage effect allowing the variance to respond differently following equal magnitude negative or positive shocks is exponential, rather than quadratic, and that forecasts of the conditional variance are guaranteed to be nonnegative. The presence of leverage effects can be tested by the hypothesis that $\gamma_i < 0$. The impact is asymmetric if $\gamma_i \neq 0$. There are a couple of differences between the EViews specification of the EGARCH model used in this paper and the original Nelson model. First, Nelson assumes the ε_t follows a Generalized Error Distribution (GED), while EViews gives a choice of normal, Student's *t*-distribution, or GED. Second, Nelson's specification for the log conditional variance is a restricted version of:

$$\log(\sigma_t^2) = \omega + \sum_{j=1}^{q} \beta_j \log(\sigma_{t-j}^2) + \sum_{i=1}^{p} \alpha_i \left| [(\varepsilon_{t-i}) / (\sigma_{t-i}) - E[(\varepsilon_{t-i}) / (\sigma_{t-i})] \right| + \sum_{k=1}^{r} \gamma_k [(\varepsilon_{t-k}) / (\sigma_{t-k})] \qquad (2)$$

which differs slightly from the specification above. Estimating this model will yield identical estimates to those reported by EViews except for the intercept term ω, which will differ in a manner that depends upon the distributional assumption and the order p. For example, in a p = 1 model with a normal distribution, the diffeence will be $\alpha_1 \sqrt{(2/\pi)}$.[4] Following these model specification issues, in Table 1 below, we try to estimate the effects of foreign exchange interventions on the level and volatility of exchange rate through EGARCH analysis for the adjusted time period of 26/02/2001 – 15/05/2006 of the daily observations with 1302 business days, letting also conditional variance affect the mean equation. For this purpose, we estimate the mean and variance equations such as in equation (3) and equation (4):[5]

$$DLNDOLLAR_t = \eta_1 + \eta_2 \sigma_t^2 + \eta_3 BUYING_t + \eta_4 SELLING2_t + \eta_5 DINTEREST_t + \varepsilon_t \quad (3)$$

$$\log(\sigma_t^2) = \omega + \alpha_1 \left| (\varepsilon_{t-1}) / (\sigma_{t-1}) \right| + \gamma_1 [(\varepsilon_{t-1}) / (\sigma_{t-1})] + \beta_1 \log(\sigma_{t-1}^2) + \delta_1 SELLING2 + \delta_2 BUYING + \delta_3 DINTEREST \quad (4)$$

Table 1: EGARCH Process of the Exchange Rate Volatility

Dependent Variable: DLNDOLLAR

Method: ML-ARCH (Marquardt) – Normal Distribution

Sample (adjusted): 26/02/2001 15/05/2006

Included observations: 1302 after adjusting endpoints

Bollerslev-Wooldridge robust standard errors & covariance

Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	-0.583115	3.116587	-0.187100	0.8516
C	-0.000596	0.000279	-2.138194	0.0325
SELLING2	-8.47E-05	4.22E-05	-2.009700	0.0445
BUYING	1.33E-05	7.70E-06	1.731101	0.0834
DINTEREST	-0.000677	0.004362	-0.155096	0.8767
		Variance Equation		
C	-1.285775	0.268390	-4.790694	0.0000
|RES| / SQR[GARCH](1)	0.434648	0.064831	6.704275	0.0000
RES / SQR[GARCH](1)	0.073700	0.042806	1.721722	0.0851
EGARCH(1)	0.901615	0.024905	36.20263	0.0000
SELLING2	-0.004257	0.001156	-3.682775	0.0002
BUYING	-0.000645	0.000767	-0.841399	0.4001
DINTEREST	0.351733	0.252477	1.393132	0.1636
AIC	-6.699553			
SC	-6.651888			
Q(20)	25.114	Prob.	0.197	
Q(36)	35.944	Prob.	0.471	
Q^2(20)	10.905	Prob.	0.949	
Q^2(36)	15.317	Prob.	0.999	

The main output from the EGARCH estimation in Table 1 is divided into two sections. The upper part provides the standard output for the mean equation, while the lower part, labeled "Variance Equation", contains the coefficients, standard errors, z-statistics and p-values for the coefficients of the variance equation.

EGARCH estimation results reveal that selling auctions have significant impact on the level of exchange rate return in a negative way, that is, selling auctions in foreign exchange market seem to decrease the exchange rate return, which differs from Korap (2006) applying to standard GARCH procedure in which we have found that selling auctions increase the exchange rate return, while in a 10% significance level buying auctions increase the return on exchange rate. We can attribute such a conclusion to the superiority of the EGARCH models to the traditional GARCH models. We could not estimate a significant impact of the interest rate cuts inside the period on the change in exchange rate level. Also no impact of conditional variance on exchange rate return could be appeared.

Considering the variance equation, since the value of the EGARCH parameter is close to one, the volatility shocks seem to be persistent so that the forecasts of the conditional variance converge to the steady state quite slowly, a result consistent with the findings of Korap (2006). The conditional variance of the exchange rate return reacts differently to equal magnitude negative and positive innovations. Domaç and Mendoza (2004) find a similar estimation result for the US$ / Mexican Peso, but the leverage effect (γ) in Turkey was found not significantly different from zero. In our paper, the leverage effect term, γ, denoted as RES/SQR[GARCH](1) in the output, is positive and statistically different from zero considering 10% significance level, indicating that the news impact is asymmetric thus the

existence of the leverage effect in the TL / US$ exchange rate return during the sample period.[6]

In Table 1, selling auctions tend to decrease the volatility in exchange market in a way similar to the findings of Domaç and Mendoza (2004), but no significant effect of buying auctions in this sense can be estimated, such as the findings of Herrera and Özbay (2005). Effectiveness of selling rather than buying auctions is observed in Selçuk (2005: 295-312) and Ardıç and Selçuk (2006: 931-942) as well, whereas Ağcaer (2003) estimates that the CBRT's interventions as a whole are effective in reducing volatilities in exchange rates. Akıncı et al. (2005a; 2005b) give support to the effectiveness of the purchase interventions rather than the sale interventions. Similar to the mean equation, there exists no statistically significant effect of the policy variable, that is, changes in overnight interest, on the exchange rate volatility. Also, dealing with diagnostics, correlogram-Q statistics for the presence of autocorrelation in the standardized residuals and in the squares of standardized residuals cannot reject the null hypothesis at the conventional significance levels in the sense that no remaining serial correlation in the mean equation is detected.

Examining Figure 1 above points out that the frequency of the CBRT's FX auctions increased by the end of 2004 till the very recent times of 2006. Thus our estimation results may be sensitive to these changes in the frequency of interventions. For this purpose, we estimate the same relationship in Table 1 by considering two sub-periods of 26/02/2001 – 26/042004 and 22/12/2004 – 15/052006, while considering the only purchase auctions for the latter.

In Table 2 and Table 3, we see that our main findings do not sensitive to considering sub-periods, and also leverage effect turns out to be statistically significant for the second sub-period.

Table 2: EGARCH Process (sub-period of 26/02/2001 26/04/2004)

Dependent Variable: DLNDOLLAR

Method: ML-ARCH (Marquardt) – Normal Distribution

Sample (adjusted): 26/02/2001 26/04/2004

Included observations: 792 after adjusting endpoints

Bollerslev-Wooldridge robust standard errors & covariance

Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	-2.476717	3.574069	-0.692968	0.4883
C	-0.000523	0.000393	-1.329865	0.1836
SELLING2	-9.00E-05	4.17E-05	-2.156448	0.0310
BUYING	1.45E-05	9.51E-06	1.520824	0.1283
DINTEREST	-0.001964	0.003382	-0.580729	0.5614
		Variance Equation		
C	-1.510042	0.443072	-3.408116	0.0007
|RES| / SQR[GARCH](1)	0.466660	0.085663	5.447621	0.0000
RES / SQR[GARCH](1)	0.072158	0.055774	1.293761	0.1957
EGARCH(1)	0.877795	0.043282	20.28076	0.0000
SELLING2	-0.004429	0.001525	-2.904453	0.0037
BUYING	-0.000778	0.000947	-0.821200	0.4115
DINTEREST	0.313756	0.280269	1.119482	0.2629
AIC	-6.342711			
SC	-6.271885			
Q(20)	26.823	Prob.	0.140	
Q(36)	35.442	Prob.	0.495	
Q^2(20)	12.338	Prob.	0.904	
Q^2(36)	17.458	Prob.	0.996	

Table 3: EGARCH Process (sub-period of 22/12/2004 15/05/2006)

Dependent Variable: DLNDOLLAR

Method: ML-ARCH (Marquardt) – Normal Distribution

Sample (adjusted): 22/12/2004 15/05/2006

Included observations: 342 after adjusting endpoints

Bollerslev-Wooldridge robust standard errors & covariance

Variance backcast: ON

	Coefficient	Std. Error	z-Statistic	Prob.
GARCH	-1.412521	11.72307	-0.120491	0.9041
C	0.000146	0.000812	0.179356	0.8577
BUYING	-6.46E-06	1.93E-05	-0.335162	0.7375
DINTEREST	-0.829730	0.350718	-2.365804	0.0180
		Variance Equation		
C	-1.178475	0.352798	-3.340364	0.0008
|RES| / SQR[GARCH](1)	0.314334	0.092657	3.392458	0.0007
RES / SQR[GARCH](1)	0.148538	0.064545	2.301303	0.0214
EGARCH(1)	0.899394	0.035477	25.35139	0.0000
BUYING	-0.002842	0.003504	-0.811217	0.4172
DINTEREST	-35.26444	70.95965	-0.496965	0.6192
AIC	-7.343843			
SC	-7.231714			
Q(20)	24.424	Prob.	0.224	
Q(36)	38.244	Prob.	0.368	
$Q^2(20)$	9.5513	Prob.	0.976	
$Q^2(36)$	15.379	Prob.	0.999	

Having established the EGARCH model of the TL / US$ exchange rate return, we now try to plotting the News Impact Curve (NIC) of the TL / US$ exchange rate return using EViews. Our goal is here to plot the volatility σ^2 against the impact $z = \varepsilon / \sigma$, where:

$$\log \hat{\sigma}_t^2 = \hat{\omega} + \hat{\beta} \log \hat{\sigma}_{t-1}^2 + \hat{\alpha} \left| z_{t-1} \right| + \hat{\gamma} z_{t-1} \qquad (5)$$

We will fix last period's volatility σ_{t-1}^2 to the median of the estimated conditional variance series and estimate the one-period impact, conditional on last period's volatility. Below is shown the NIC of TL / US$ exchange rate return in Figure 2:

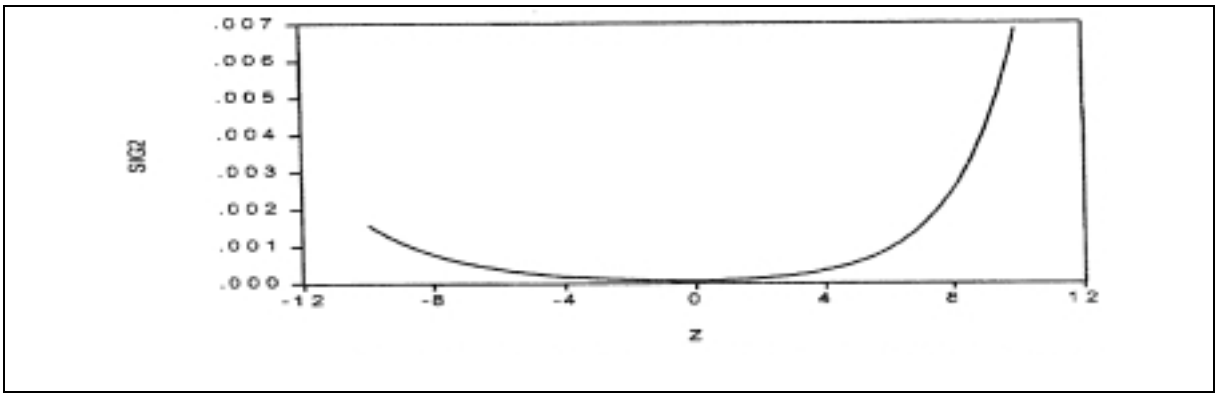

Figure 2: *News Impact Curve (NIC) of the TL/US$ Exchange Rate Return*

An asymmetric leverage effect can easily be noticed in Figure 2, opposed to the findings of Domaç and Mendoza (2004) which estimate a fully symmetric NIC with an insignificant leverage effect for the case of Turkey. Following Domaç and Mendoza (2004), from the standpoint of the foreign investor, the response of the conditional variance would be greater to bad news (depreciations) than to good news (appreciations) of the same magnitude. And so, we can here conclude that the conditional variance of the TL / US$ exchange rate return reacts more to past positive shocks than to negative innovations of equal size. An econometric interpretation of this case may be brought out such that an unanticipated increase in exchange rate return would lead to more uncertainty when compared with the case of an unanticipated decrease in that.

IV. CONCLUDING REMARKS

In our paper, we try to investigate how effective are the interventions of the CBRT in the foreign exchange (FX) market for the post-crisis period. For this purpose, we examine the course of the sale and buying auctions implemented in FX market, and estimate the policy conclusions of these interventions on both the mean and the volatility of exchange rate return using Exponential GARCH (EGARCH) estimation procedure of contemporaneous econometrics, letting asymmetries in the conduct of policies affect the volatilies occured in the economy. In line with the monetary policy reports of the CBRT and constructed model estimation process revealing the effectiveness of these interventions, we find that sale auctions seem to be effective in reducing volatilities in FX market, whereas buying auctions fail to attain this policy objective. We can also conclude here that buying auctions implemented by the end of 2004 till the mid-2006 might be aimed at accumulating FX reserves rather than decreasing volatilities in the market, opposed to the very early periods of the post-2001 crisis and similar to the findings of Ardıç and Selçuk (2006: 931-942), as well as may indicate the policy ineffectiveness of monetary authority. Further, we estimate that the behaviour of economic agents might be increased the exchange rate volatility more due to the unanticipated increases in exchange rate return than unanticipated decreases.

NOTES

[1]See Fischer (2001: 3-24), Dornbusch (2001), Eichengreen (2001), Alper (2001: 51-71), Uygur (2001), Akyüz and Boratav (2001), Yeldan (2001), Ertuğrul and Yeldan (2002: 53-67) and Ekinci and Ertürk (2004) for various papers on the Turkish economy, relating the lack of the implementation of the 2000-stabilization program and ensuing of the crisis conditions either to some moral hazard problems leading to credibility and coordination problems in implementation of the stabilization program between the market participants, policy makers and

IMF such as the issues raising doubts about fiscal sustainability in rolling over the short-term debt by investors, or to some structural weakness of the exchange rate backed disinflation program as manifested in its liquidity creation mechanism in a small and fragile financial system as well as serious shortcomings in both its design and implementation and crisis management. Ertuğrul and Selçuk (2001: 6-28) and Korap (2006) give a brief account of the Turkish economy from the late-1980s till the early-2000s as well as a brief outline of these papers and some others upon the 2000/2001 crisis conditions and post-crisis policy proposals.

[2] Beginning by the late June 2006, the CBRT implements some sale auctions in the FX market due to the high volatility occured in the FX market. But, these are out of interest in this paper.

[3] Considering the Turkish economy as a case study, Ağcaer (2003),Domaç and Mendoza (2004), Selçuk (2005: 295-312) and Ardıç and Selçuk (2006: 931-942), Guimarães and Karacadağ (2004), Herrera and Özbay (2005), Akıncı et al. (2005a, 2005b) and Korap (2006) recently try to analyze how the foreign exchange market responses to central bank interventions in a floating exchange rate system. A brief outline of these papers can be found in Korap (2006). Besides, Sarno and Taylor (2001: 839-868), Canales-Kriljenko et al. (2003) and Ağcaer (2003) consider the policy issues and surveys of methodologies dealing with foreign exchange interventions, and give international evidence on the effectiveness of such kind of interventions.

[4]In Korap (2006), we apply to standard generalized autoregressive conditional heteroskedasticity (GARCH) methodology of Bollerslev (1986: 307-327) in analyzing the effectiveness of FOREX operations of the CBRT. Using EGARCH methodology in this paper, we try to determine whether the estimation results in Korap (2006) can be confirmed by using a larger time period in estimation sample including recent developments and policy actions in this sense by the whole 2005 and the first half of 2006, and different from Korap (2006), to allow for the inclusion of negative variables affecting volatility, which, in turn, makes it possible to analyze the components of the intervention operations – i.e. sales and purchases as well (Domaç and Mendoza, 2004)

[5] To deal with potential model misspecification, we have calculated robust t-ratios using the quasi maximum likelihood method suggested by Bollerslev and Wooldridge (1992: 143-172) so that parameter estimates will be unchanged the esimated covariance matrix will be altered.

[6] Following Domaç and Mendoza (2004) and Ardıç and Selçuk (2006: 931-942), we also calculate here te half-life of the exchange rate return as $\log(0.5) / \log(\beta)$ measuring the duration of shocks to the exchange rate return, and defined as the duration of time period for half the magnitude of a unit shock to the level of a series to dissipate (Cashin and MacDermott, 2003: 323-324; Civcir, 2002). In this line, a volatility shock to the TL / US$

conditional variance reached half its original size in 7 days, which is larger than the estimates of Domaç and Mendoza (2004). Ardıç and Selçuk (2006: 931-942) also estimate the half-life between 5 and 11 days.

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