MEASURING THE IMPACT OF MONETARY POLICY ON THE LIRA EXCHANGE RATES

A Master's Thesis

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The Institute of Economics and Social Sciences
of
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by

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I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Economics.

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ABSTRACT

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September 2010

Measuring the impact of monetary policy on the exchange rate is complicated due to the simultaneous response of monetary policy to the exchange rate and the possibility that both variables respond to other omitted variables. Ignoring these problems may lead to biased results. Given the shortcomings of commonly-used identification techniques, this paper uses an identification method based on the heteroscedasticity in the high-frequency data. This methodology which aims to identify the exchange rate response to monetary policy is based on the increase in the variance of the policy shock on monetary policy committee meeting dates. Identification through heteroscedasticity gives more accurate estimates and the results of this paper provide a cross-check for previous findings in the literature. The results suggest that while statistically there exist some bias in previous estimates, qualitatively the conclusion drawn by the previous literature, that the effect of monetary policy on the lira exchange rates is small, is verified.

Keywords: Monetary Policy, Lira Exchange Rates, Identification through Heteroscedasticity

ÖZET

PARA POLİTİKASININ LİRA DÖVİZ KURLARINA ETKİSİNİN ÖLÇÜLMESİ

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Para politikası ve döviz kurunun eşzamanlı tepkisi ve her iki değişkenin de diğer dışlanmış değişkenlere tepki göstermesi olasılığı gibi problemler para politikasının döviz kuru üzerine etkisinin ölçülmesini karmaşıklaştırmaktadır. Bu problemleri görmezden gelmek sapmalı sonuçların ortaya çıkmasına yol açabilir. Bu tezde, yaygın olarak kullanılan tekniklerin yetersizlikleri göz önünde bulundurularak, yüksek frekanslı verilerde bulunan değişen oynaklığa (heteroscedasticity) dayalı bir belirleme yöntemi kullanmıştır. Bu yöntem, para politikasının döviz kuruna etkisini ölçmek için, politika şokunun para politikası kurulu toplantı günlerinde varyansının artmasına dayanmaktadır. Değişen varyans yoluyla ayırt etme daha kesin tahminler vermekte dolayısıyla bu tezin sonuçları literatürdeki geçmiş bulgulara bir karşılaştırma sunmaktadır. Bu sonuçlar, istatistiksel olarak, önceki tahminlerde sapmalar olduğunu gösterirken, nitelik bakımından, önceki literatürün para politikasının Lira döviz kurlarına etkisinin küçük olduğuna dair sonuçlarını doğrulanmıştır.

Anahtar Kelimeler: Para Politikası, Lira Döviz Kurları, Değişken Varyans Yoluyla Ayırt Etme

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CHAPTER 1

INTRODUCTION

The exchange rate may be a channel for the transmission of monetary policy. For this reason, the exchange rate response to monetary policy is of interest to the central banks, firms, and foreign exchange markets alike so the subject has been extensively studied in the literature.[1] However, there are difficulties in the measurement of this effect. To begin with, while the exchange rate may be affected by monetary policy, policy may also respond to the changes in the exchange rate; therefore, when the data is measured in low frequency, there is simultaneous response of both variables to each other and the direction of causality is difficult to establish. Moreover, there may be other unobservable common factors affecting both policy decisions and the exchange rate such as macroeconomic news and changes in the risk preferences. Hence, measurement is complicated on account of the endogeneity problem and the possibility of omitted relevant variables.

Due to simultaneity and omitted variable biases that arise when two related jump variables are analyzed econometrically, low-frequency (such as monthly or quarterly) VAR based approaches which include lagged values of two variables in question as well as observable macroeconomic shocks are not suitable for studying the relationship between monetary policy and asset prices. Thus, high-frequency data is studied with the event-study approach, which is the ordinary least squares (OLS) regression of changes in asset prices on monetary policy surprises on monetary policy dates. Aktas et al. (2009) carry out this approach for Turkey and find that

[1] See Amato et al. (2005) for a survey.

monetary policy does not affect exchange rates much. The event-study approach assumes that the ratio of the policy shock to the exchange rate shock and that of the policy shock to the other shocks go to infinity on the monetary policy (monetary policy committee meeting) dates. Yet, these two assumptions are not tested.

The goal of this study is to measure the response of the exchange rate to monetary policy in Turkey by an alternative method; identification through heteroscedasticity with high-frequency data to circumvent simultaneity and omitted variable biases and therefore to establish causality from policy to exchange rates. With this identification approach, the change in the variance of the policy shock on the policy dates allows measuring the exchange rate response to the policy change with a rather weak set of assumptions. Using this method relaxes the strict assumptions needed for the event-study approach. Indeed, under the assumptions of the event-study method, heteroscedasticity based identification is also valid. However, these assumptions, while sufficient, are not necessary for identification through heteroscedasticity.

Heteroscedasticity based identification is a relatively new method (Rigobon, 2003), very rare for emerging markets and to the extent of my knowledge my paper is the first study to employ this estimator for Turkish data together with a concurrent study by Duran et al. (2010) which is not concerning with exchange rates.[2]

The paper is organized in the following way. Section 2 briefly reviews the literature on financial markets' reaction to monetary policy actions. In Section 3 the methodology is analyzed in detail and data is briefly discussed. Section 4 summarizes the results. Section 5 presents the hypothesis tests and section 6 concludes.

[2]Rezessy (2005) and Goncalves and Guimaraes (2007) carry out the heteroskedasticity-based identification methodology to the exchange rate and other asset prices in Hungary and Brazil, respectively.

CHAPTER 2

BACKGROUND

The first event-study paper to assess financial markets' reaction to monetary policy actions belongs to Cook and Hahn (1989), who examined the one day response of longer-term interest rates to changes in monetary policy. They found a significant response but the independent variable was the raw change in the federal funds rate target while under rational expectations expected changes should not affect asset prices. Using federal funds futures, Kuttner (2001) decomposed the changes in the federal funds rate target into anticipated and unanticipated components, and again using an event-study approach, found that unanticipated increases in the federal funds rate target increased interest rates at all maturities. Gürkaynak et al. (2005) also use this methodology and find similar results.

For the Turkish case, Aktas et al. (2009) studied the response of asset prices to the Central Bank of Turkey's policy decisions by decomposing monetary policy into the expected and unexpected components. They used the change in one month treasury rate on policy dates as the surprise measure and found that longer term interest rates respond significantly to the unanticipated component of monetary policy but, crucially for this paper, also found that the exchange rate reaction is small.

After Rigobon (2003) presented the identification method through heteroscedasticity, Rigobon and Sack studied both the impact of the change in the asset prices on the monetary policy decisions and the response of asset prices to the monetary policy shocks by using heteroscedasticity-based generalized method of moments (GMM) technique and instrumental variables (IV) regression in their 2003 and 2004 papers. Since these methods require weaker assumptions compared to the ES approach, they are considered more reliable.[3] In the former paper, they found a significant positive effect of asset prices on monetary policy, that is, they came to the conclusion that policy makers respond to changes in asset prices. In the latter one, in which it is assumed that the variance of monetary policy shocks is higher on the days of federal open market committee meeting dates, they developed an estimator identifying the response of asset prices based on the heteroscedasticity of monetary policy shocks. They found a significant negative impact of monetary policy on asset prices. Moreover, they conclude that the estimate of the event-study approach is higher in absolute value indicating a bias resulting from the presence of other common shocks.

Following Rigobon and Sack, an increasing number of studies have examined the response of asset prices including exchange rates to monetary policy using heteroscedasticity-based methods. Ehrmann et al. (2005) study the degree of financial transmission between money, bond and equity markets and exchange rates within and between the United States and the Euro area making use of the heteroscedasticity-based GMM method. They find that a strong asset prices reaction to other United States' asset price shocks as well as to developments in the Euro area. Also, Bohl et al. (2008), using heteroscedasticity-based IV method, analyze the reaction of European stock market returns to unexpected interest rate decisions by the European Central Bank (ECB) in an industry specific market dimension, and find a significant, negative relation between surprise ECB decisions and European stock market performance. Kholodin et al. (2009) implement both heteroscedasticity-based IV and GMM methods and find similar results. In addition, Kholodin et al. (2009) provide a comparison of these estimates with the event-study estimates,

[3]Rigobon and Sack (2004) show that the GMM method is theoretically more efficient than the IV method. The heteroskedasticity-based GMM technique is explained in detail in the next section.

concluding that the event-study estimates are biased for most of the sectoral equity indices in the Euro area.

CHAPTER 3

METHODOLOGY AND DATA

The goal of this study is to measure the impact of monetary policy on the exchange rate by heteroscedasticity based identification method as a cross check for the previous results in the literature. To deal with the identification problem inherent in interpreting exchange rate movements, heteroscedasticity present in the policy shocks will be emphasized. The strategy being used in this study is closely related to the recent work on the interest rate effects of monetary policy shocks.

Rigobon (2003) developed a method for identification based on the heteroscedasticity in the data. He focuses on the co-movements of interest rates and asset prices when the variance of one of the variables is known to shift. The relationship of interest of this paper is the response of exchange rate to the policy shock.

Formally, the dynamics of the short-term interest rate and the exchange rate are written as follows:

$$\Delta i_t = \beta \Delta e_t + \gamma z_t + \varepsilon_t, \qquad (1)$$

$$\Delta e_t = \alpha \Delta i_t + z_t + \eta_t, \qquad (2)$$

where Δi_t is the change in the short-term interest rate and Δe_t is the change in the exchange rate. Equation (1) is the monetary policy reaction function that allows the short-term interest rate to be affected by the exchange rate and a set of variables z_t which may or may not be observed. Equation (2) represents the exchange rate equation which captures the exchange rate response to monetary policy and the other variables z_t.[4] The variable ε_t is the monetary policy shock, and η_t is a shock to the exchange rate. The residuals ε_t and η_t are assumed to be serially uncorrelated and to be uncorrelated with each other and with the common shock z_t.

In this paper, the parameter of interest is α, which measures the impact of a change in the short-term interest rate Δi_t on the exchange rate Δe_t. The OLS estimate of α is as follows:

$$\hat{\alpha} = \left(\Delta i_t' \Delta i_t\right)^{-1} \Delta i_t' \Delta e_t \ , \tag{3}$$

The mean of $\hat{\alpha}$ is:

$$E(\hat{\alpha}) = \alpha + (1 - \alpha\beta) \frac{\beta\sigma_\eta + (\beta + \gamma)\,\sigma_z}{\sigma_\varepsilon + \beta^2\sigma_\eta + (\beta+\gamma)^2\,\sigma_z} \ , \tag{4}$$

where $E\,(.)$ is the expectation operator and σ_x represents the variance of shock x.

According to equation (4) the OLS estimate would be biased away from its true value α due to both

i) simultaneity bias (if $\beta \neq 0$ and $\sigma_\eta > 0$), and

ii) omitted variables bias (if $\gamma \neq 0$ and $\sigma_z > 0$)

Hence, estimating equation (2) alone with OLS may suffer from both the presence of simultaneous equations and omitted variables.

The first thing needed to apply the identification method through heteroscedasticity is to isolate a period of time where the variance of the policy shock shifts while the variance of other shocks remains constant. This enables establishing causality from policy to the exchange rate on the chosen dates, which is the basis for identification.

For the implementation of this approach, two subsamples, denoted by P and N are essential. P stands for the policy dates (monetary policy committee meeting

[4]Coefficient of z_t in (2) is normalized to unity since it is an unobservable variable. This has no effect on the measurement of α. The setup is flexible enough to include observable common factors as well.

days) and N stands for the non-policy dates (days immediately preceding the policy days). There are two assumptions for the heteroscedasticity based identification method as follows:

i) The parameters of the model, α, β and γ are stable across the two subsamples.

ii) The policy shock is heteroscedastic and the other shocks are homoscedastic, which are represented in the following equations:

$$\sigma_{\varepsilon}^{P} > \sigma_{\varepsilon}^{N}, \tag{5}$$

$$\sigma_{z}^{P} = \sigma_{z}^{N}, \tag{6}$$

$$\sigma_{\eta}^{P} = \sigma_{\eta}^{N}, \tag{7}$$

It is worth mentioning that the assumption required for the event-study approach is that in the limit, the variance of the policy shock becomes infinitely large relative to the variance of other shocks, that is $\frac{\sigma_{\varepsilon}}{\sigma_{\eta}} \rightarrow \infty$ and $\frac{\sigma_{\varepsilon}}{\sigma_{z}} \rightarrow \infty$ on policy dates. On the other hand, the assumption needed for identification method through heteroscedasticity which only requires that relative significance of monetary policy shocks rises dramatically on policy dates is weaker than that of the event-study approach.

Under the assumptions i and ii, identification of the parameter of interest is possible and detailed analysis is presented below.

Reduced form equations for equation (1) and equation (2) are as follows:

$$\Delta i_t = \frac{1}{1-\alpha\beta}\left[(\beta+\gamma)\,z_t + \beta\eta_t + \varepsilon_t\right], \tag{1'}$$

$$\Delta e_t = \frac{1}{1-\alpha\beta}\left[(1+\alpha\gamma)\,z_t + \alpha\varepsilon_t + \eta_t\right], \tag{2'}$$

The covariance matrices of the variables in each subsample are the following:

$$\Omega_P = E\left[\left[\Delta i_t \Delta e_t\right]' \left[\Delta i_t \Delta e_t\right] \mid t \in P\right]$$

$$\Omega_N = E\left[[\Delta i_t \Delta e_t]' [\Delta i_t \Delta e_t] \mid t \in N\right]$$

or explicitly,

$$\Omega_P = \begin{bmatrix} \sigma_\varepsilon^P + (\beta+\gamma)^2 \sigma_z^P + \beta^2 \sigma_\eta^P & \alpha\sigma_\varepsilon^P + (\beta+\gamma)(1+\alpha\gamma)\sigma_z^P + \beta\sigma_\eta^P \\ . & \alpha^2\sigma_\varepsilon^P + (1+\alpha\gamma)^2 \sigma_z^P + \sigma_\eta^P \end{bmatrix}$$

$$\Omega_N = \begin{bmatrix} \sigma_\varepsilon^N + (\beta+\gamma)^2 \sigma_z^N + \beta^2 \sigma_\eta^N & \alpha\sigma_\varepsilon^N + (\beta+\gamma)(1+\alpha\gamma)\sigma_z^N + \beta\sigma_\eta^N \\ . & \alpha^2\sigma_\varepsilon^N + (1+\alpha\gamma)^2 \sigma_z^N + \sigma_\eta^N \end{bmatrix}$$

Under the assumptions i and ii of the model, the difference in the covariance matrices Ω_P and Ω_N is as follows:

$$\Delta\Omega = \Omega_P - \Omega_N = \frac{\left(\sigma_\varepsilon^P - \sigma_\varepsilon^N\right)}{(1-\alpha\beta)^2} \begin{bmatrix} 1 & \alpha \\ \alpha & \alpha^2 \end{bmatrix}, \tag{8}$$

Denoting $\lambda \equiv \frac{\sigma_\varepsilon^P - \sigma_\varepsilon^N}{(1-\alpha\beta)^2}$, (8) becomes the following:

$$\Delta\Omega = \begin{bmatrix} \lambda & \lambda\alpha \\ \lambda\alpha & \lambda\alpha^2 \end{bmatrix}, \tag{8'}$$

Thus, the impact of policy changes on the exchange rate, namely the parameter α, can be identified from the change in the covariance matrix $\triangle\Omega$. The coefficient α can be estimated in two different ways: by generalized method of moments (GMM) estimation and instrumental variables (IV) regression (Rigobon and Sack, 2004). However, Baum et al. (2002) suggests that the conventional IV estimator is consistent but inefficient in the presence of heteroscedasticity. Not only that, as shown in Rigobon and Sack (2004), IV estimation makes use of only two equations of $(8')$, resulting in multiple estimates of α. On the other hand, GMM utilizes all three orthogonality conditions in $(8')$, allowing for efficient estimation, that is, there is an improvement in efficiency from incorporating the additional moment conditions into the estimation in GMM estimation compared to the IV estimation. Thus, in this paper, GMM estimation will be used to obtain the estimate of exchange rate response to monetary policy changes. Besides, in the GMM approach, the overidentification restrictions enable us to test the model as a whole.

3.1 Implementation Through GMM

There are two parameters to be estimated; namely,

(i) α (the parameter of interest)

(ii) $\lambda \equiv \frac{\sigma_\varepsilon^P - \sigma_\varepsilon^N}{(1-\alpha\beta)^2}$ (a measure of the degree of heteroscedasticity that is present in the data)

For implementation of the procedure, a GMM estimator will be used under the two assumptions of the heteroscedasticity based identification; that is the stability of the parameters of the model and heteroscedasticity of monetary policy shock together with homoscedasticity of other shocks. The sample estimate of the difference in the covariance matrix, $\triangle\Omega$, is

$$\Delta\hat{\Omega} = \hat{\Omega}_P - \hat{\Omega}_N, \tag{9}$$

where

$$\hat{\Omega}_i = \frac{1}{T_i} \sum\nolimits_{t\in[1,T]} \delta_t^i \left(\Delta i_t \Delta e_t\right)' \left(\Delta i_t \Delta e_t\right) \quad for\ i = P, N$$

δ_t^P and δ_t^N are dummy variables taking on the value 1 for the days in each subsample, respectively; and $T^P = \sum_{t\in[1,T]} \delta_t^P$, and $T^N = \sum_{t\in[1,T]} \delta_t^N$ are sample sizes of the subsamples.

The assumptions suggest that the following moment conditions hold:

$$E\left[b_t\right] = 0$$

where

$$\begin{aligned} b_t &= vech\left(\Delta\hat{\Omega} - \Delta\Omega\right) \\ &= vech\left(\left(\frac{T}{T^P}\delta_t^P - \frac{T}{T^N}\delta_t^N\right)(\Delta i_t \Delta e_t)'(\Delta i_t \Delta e_t) - \lambda\left[\begin{array}{cc} 1 & \alpha \end{array}\right]'\left[\begin{array}{cc} 1 & \alpha \end{array}\right]\right) \end{aligned}$$

,or explicitly

$$\begin{aligned} \alpha &= \frac{\Delta\Omega_{12}}{\Delta\Omega_{11}}, \\ &= \frac{\Delta\Omega_{22}}{\Delta\Omega_{12}}, \\ &= \sqrt{\frac{\Delta\Omega_{22}}{\Delta\Omega_{11}}} \end{aligned}$$

The GMM estimator is based on the condition that $\lim_{T\to\infty}\frac{1}{T}\sum_{t\in[1,T]} b_t = 0$. The intuition behind GMM is to choose an estimator for $\Delta\Omega$, $\Delta\hat{\Omega}$, that sets the three sample moments as close to zero as possible. Since I have more moment conditions than unknowns, $(8')$ is overidentified, and it may not be possible to find an estimator setting all three moment conditions to exactly zero. In this case, I take a 3×3 weighting matrix, W_3, and use it to construct a quadratic form in the moment conditions.

The estimates of α and λ will be obtained by minimizing the following loss function:

$$\left[\hat{\alpha}^{GMM}, \hat{\lambda}\right] = \arg\min\left[\sum_{t\in[1,T]} b_t\right]' W_3 \left[\sum_{t\in[1,T]} b_t\right], \tag{10}$$

Practically, GMM estimation proceeds in two steps. Initially, GMM estimation with an identity weighting matrix, i.e. taking $W_3 = I_3$ is conducted to obtain a consistent estimator of coefficients. In the second step, W_3 is formed based on obtained residuals. Accordingly, W_3, the optimal weighting matrix equal to the inverse of the estimated covariance matrix of the moment conditions is obtained. The efficient GMM estimator is calculated based on (10).

3.2 Data

The analysis is carried out using daily data. The data source for short term interest rate is the Central Bank of Turkey's database and the TRL/USD and the TRL/EUR exchange rates are taken from the Datastream. The policy rate is proxied by the yield on government bonds with one month maturity. Since the data is not available for all days, interpolation method is applied to construct the treasury bonds having 1 month maturity. An advantage of using this policy rate is that it moves only to the extent that there is a policy surprise. The short term rate is constructed as the daily changes of the interest rate series in basis points while the exchange rates are the daily percentage changes. The sample covers the period 2005:1-2010:1. To apply the heteroscedasticity based identification method, I first picked the monetary policy dates which correspond to 61 monetary policy committee meeting days over the sample so that the size of the first subsample, P, is 61. Also, for the non-policy dates, N, I chose the days immediately preceding those included in P, implying that the size of the second subsample, N, is also 61. With the adopt of inflation targeting in 2005, the influence of monetary policy over the financial markets is expected to increase.

Similar data on policy dates are also used by İnal (2006) and Aktas et al. (2009), Duran et al. (2010) with different samples. Moreover, to apply the event-study approach, they used the treasury bonds having 1 month maturity to identify the surprise component of the policy rate.

In Figure 1, the data are plotted in levels:

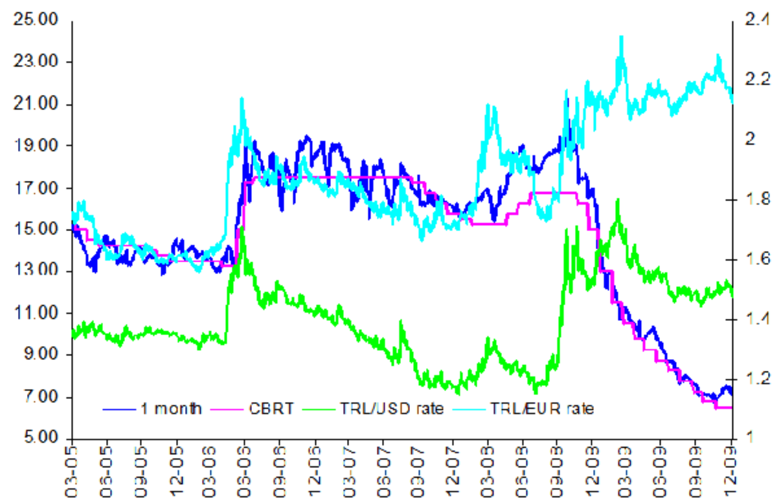

Figure 1: Policy Rate and the Exchange Rates

There is no clear relationship observed over time between the short-rate and the exchange rates.

The descriptive statistics for the daily changes of the policy rate and the exchange rates are reported in Table 1:

Table 1: The Standard Deviations and the Correlations with the Policy Rate on the Policy Dates and the Non-policy Dates

	Standard Deviation		Correlation	
	N	P	N	P
Policy Rate	0.17	0.35		
Exchange Rates				
TRL/USD	1.04	0.87	0.20	-0.09
TRL/EUR	0.99	0.92	0.43***	-0.21*

* and *** are significant at the 10% and 1% significant level respectively.

The variance of changes in the short-term interest rate rises on the days with higher variance of policy shocks, as expected. More importantly, for the non-policy dates, there is no noticable relationship between the policy rate and the exchange rates, as evidenced by the relatively small change in the variances from non-policy to policy dates. It is important to note that the variances of the exchange rates are smaller during policy dates, while the variance of the policy rate moves in the opposite direction. Hence, looking only on the variances, one cannot expect a significant reaction of exchange rates to policy changes.

The correlations seem to differ, and change sign on policy rates. Although the correlations with the policy rate were positive during non-policy (N) dates (0.20 for the dollar rate and 0.43 for the euro rate), they turn to negative during the policy (P) dates (-0.09 for the dollar rate and -0.21 for the euro rate). This might be due to the fact that, on the policy dates, the impact of the policy on the currency dominates the effect of the risk premium, making the overall relationship negative.

CHAPTER 4

RESULTS

As mentioned earlier, I estimate the impact of the change in the interest rate on exchange rates by heteroscedasticity based identification approach. In addition, this study is a cross check for the previous results in the literature. In other words, the focus of the analysis is to compare the parameter estimated by the event-study approach and that of the heteroscedasticity based identification method. Hence, I conduct the procedure first by event-study estimation.

4.1 Event-Study Estimates

I based my analysis on the model, that is also used by Kuttner (2001), Inal (2006) and Aktas et al. (2009), to obtain the parameter estimates of the event-study (ES) approach. The regression equation is as follows:

$$\Delta e_t = \alpha_0 + \alpha_1 i_t^s + \alpha_2 i_t^e + u_t, \tag{11}$$

where $\triangle e_t$ is the percentage change in the TRL/EUR and TRL/USD exchange rates; i_t^e and i_t^s are expected and surprise components of monetary policy changes, respectively; and u_t is the factors except the policy changes which affects the exchange rate.

The results are summarized in the second column of Table 2:

Table 2: Estimation Results

	Event Study	Heteroscedasticity-based GMM
TRL/USD	$-0,224$ $(0,315)$	$-0,511$ $(0,438)$
TRL/EUR	$-0,517$ $(0,336)^{*}$	$-0,997$ $(0,395)^{***}$
Notes:	Standard errors are in parenthesis. * and *** indicate the significance levels at 1% and 10% levels respectively.	

Estimation results are compatible with the findings of Aktas et al. (2009). The expected component of monetary policy changes does not have a large impact either on the change in the TRL/EUR or on the change in the TRL/USD. Moreover, even though the effect of the surprise component of the policy changes on TRL/EUR is found to be statistically significant at the 10% significance level, the estimated coefficient $\hat{\alpha}_1$ (0.517 in absolute value) is small in magnitude, suggesting that a one percentage point change in the unanticipated component of the policy rate causes only 0.517 % change in the TRL/EUR exchange rate in the opposite direction. The results of the event-study estimation implies that the impact is very small.

4.2 GMM Estimates

The results obtained with GMM is shown in the third column of Table 2. Monetary policy changes do not have a large impact either on the change in the TRL/USD rate or on the change in the TRL/EUR rate. Even though the effect of the policy changes on TRL/EUR rate is found to be statistically significant, the estimated coefficient (0.997 in absolute value) is small in magnitude, suggesting that a one percentage point change in the unanticipated component of the policy rate causes only 0.997 % change in the TRL/EUR exchange rate in the opposite direction. The policy rate does not have a significant impact on the TRL/USD rate. Moreover, there is no cross currency effect, that is, the impacts on the TRL/EUR and the TRL/USD rates are not statistically different.[5]

[5] Results are not statistically different from Aktaş et al. (2009) while point estimates are larger in absolute value.

It is important to note that the estimated responses of exchange rates under the HC based identification method are almost always larger (in absolute value) than the corresponding estimates under the ES approach, but the impact is small in magnitude. This difference between the two estimates likely reflects the bias in the ES estimates. A possible explanation for this bias is that increases in the risk preferences increase the exchange rate. Accordingly the central bank increases the policy rate in order to prevent the capital outflow. Hence, both policy rate and the exchange rates move in the same direction as a result of a common shock. These shocks cause an appreciation bias in the ES estimate. The hypothesis that the HC based and ES estimates are equal is tested in the next section.

CHAPTER 5

HYPOTHESIS TESTS

5.1 The Test of Overidentifying Restrictions (OIR)

In estimating equation (8) , I have more moment conditions than unknowns (I have 3 moment conditions and 2 unknowns), the system is overidentified. The overidentifying restrictions are tested with the following test statistic:

$$\hat{q} = \bar{m}(\alpha)' V^{-1} \bar{m}(\alpha)$$

where V^{-1} is the variance of the difference of the estimators. Under the null that the model is correctly specified, the test statistic is distributed χ^2 with 1 degrees of freedom.

The null hypothesis suggests that all assumptions of HC based identification approach are valid.

In the second column of Table 2, the results of the over-identifying restrictions tests are shown. The results show that the over-identifying restrictions of the heteroskedasticity-based estimators are easily accepted for both TRL/USD and TRL/EUR exchange rates. Hence, the moment conditions are consistent with each other.

Table 2: Hypothesis Test Results

	Over Identification Test Results	Hausman Test Results for Biasedness
	GMM-OIR	GMM-ES
TRL/USD	$0,744$	0,895
TRL/EUR	$0,909$	5,194**

Notes: GMM over identification test has a $\chi^2(1)$ distribution.

$F_{1,59}$ distribution is used for the Hausman biasedness test.

** indicate the significance level at 5% level.

5.2 GMM versus ES

One of the main concerns of this paper is to test the validity of strong assumptions of the ES approach. For this purpose, I compare the estimates under HC based identification method (GMM) to the ES approach (OLS on policy dates). The validity of the ES assumptions are tested with a Hausman specification test. Under the null hypothesis that both estimators are consistent and under the alternative hypothesis only GMM estimate is consistent and OLS estimate is inconsistent, Hausman's m-statistic is:

$$\mathrm{m} = \left(\hat{\alpha}^{GMM} - \hat{\alpha}^{ES}\right)' [\mathrm{Var}(\hat{\alpha}^{GMM}) - \mathrm{Var}(\hat{\alpha}^{ES})]^{-1} (\hat{\alpha}^{GMM} - \hat{\alpha}^{ES})$$

The m-statistic is distributed F with $1, (T-1)$ degrees of freedom.

The results of Hausman test is illustrated in the third column of Table 2. The test of the equality of the heteroscedasticity-based and event-study estimates is not rejected for TRL/USD exchange rate, implying that we cannot reject the null hypothesis that ES assumptions are valid and ES estimate is consistent. However, the results indicate that the test statistic for TRL/EUR exchange rate is significant at 5 % significance level, that is the assumptions underlying the event-study approach are violated enough to produce a bias in the event-study estimates that is marginally significant. Hence, for Euro exchange rate, some bias exists in the event-study estimates for TRL/EUR rate, with the heteroscedasticity-based estimates indicating a larger impact of monetary policy on the exchange rate; and ES estimate for TRL/EUR rate is inconsistent as well as GMM estimate is consistent.

CHAPTER 6

CONCLUSION

In this paper, the impact of changes in monetary policy on exchange rates is measured with a heteroscedasticity based identification method, in which the parameter of interest is estimated from the heteroscedasticity of policy shocks on monetary policy committee meeting days. The technique is implemented with a GMM approach.

The empirical results are compared with the results using the most popular approach in the literature, the event study analysis. Both methods depend on an increase in the variance of the monetary policy shocks on the MPC meeting days. In the event-study approach, the shift in the variance of the policy shock should be large enough to dominate all other shocks. For identification; however, in the HC based method, identification of the parameter of interest is possible with rather weak set of assumptions. The validity of the ES assumptions is compared using HC based estimates.

The findings are in line with the literature. The results illustrate that increases in the short-term interest rate (policy rate) lead to a small appreciation of the domestic currency. This impact is found to be statistically significant only for the TRL/EUR exchange rate. The estimated parameters compared to the coefficients obtained under ES approach suggest that some bias exists in the ES estimates. Notedly, the heteroscedasticity-based estimates imply a larger negative impact of monetary policy on the Lira exchange rates. The direction of the differences in the estimated coefficients for both methods reflect the potential biases of the event-study estimates arising from endogeneity and omitted variables.

The differences between these estimators are used to statistically test whether the strong assumptions essential for the event-study approach are valid. Especially, the biases in the ES estimates are found to be statistically significant for TRL/EUR exchange rate, implying that the assumptions under the ES approach are violated. Notably, HC based estimates come up with larger impact (in absolute value) of policy rate on exchange rates, which reflects possible biases resulting from simultaneity and/or omitted variables. Even so, the resulting estimate is still small in magnitude.

These findings suggest a weak evidence that the monetary policy transmission mechanism through exchange rate channel work in Turkey.

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