THE EFFECT OF POLICY INTEREST RATE WITHIN THE FRAMEWORK OF THE TURKISH INFLATION TARGETING

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Abstract

In conducting monetary policy under the inflation-targeting framework, the monetary policy stance is signaled through the policy interest rate. Any change in policy interest rate leads first to a change in interest rates on the interbank and latter to change in interest rates of bank credits. The result is a contraction of credit driven aggregate demand and ultimately a weakening of inflation pressures. From the point of view indicated above, this study aims to analyze the effect of interest rate policy on total economic activity within the framework of inflation targeting in Turkey after 2001. In line with this goal, the study investigates the degree and speed of interest rate pass-through from policy rates to retail banking rates by adopting a single equation Error Correction Model for the monthly data over the period from January 2002 to December 2013 in Turkey. By indicating that policy rate has a considerable impact on retail banking rates, empirical findings show that central bank of Turkey has a suitable monetary transmission mechanism in order to use policy interest rate to control credit driven demand and eventually prices in the framework of inflation targeting regime.

Key words: Interest Rate Pass-Through, Retail Bank Rate, Inflation Targeting,
JEL Code: E40, E50, E52

Introduction

Transmission mechanism and effectiveness of monetary policy have been ever more at the center of discussions on macroeconomic policymaking. However, most of the academics and policy makers have advocated in recent years that the stabilization of inflation should be left to inflation targeting programme as a monetary policy rule (Mishkin, 1995, 3). Consequently, inflation targeting has become the main policy objective for most of the central banks in the last decades.

In the framework of inflation targeting, central bank directly determines the inflation rate as an ultimate goal of monetary policy without specifying any intermediate targets. Central banks try to minimize deviations of inflationary expectations from the inflation target by using the effects of policy interest rate on the basic components of total demand like consumption and investment. If inflation is away from the target, central bank attempts to bring it back to target by managing aggregate demand with policy interest rate via affecting the supply of bank credit for households and firms (Svensson 1999, 609).

Thus, the progressive shift towards inflation targeting in developed and developing economies in last decades caused to growing use of short term policy interest rate as an operating instrument by central banks. This process has also underscored the need to better understand the all aspects of monetary transmission channel of policy interest rate due to the fact that effectiveness of inflation targeting depends on a strong transmission mechanism of policy interest rate. Accordingly, the relationship between short-term policy rate and money market or retail banks' rate becomes an increasingly important issue since successful inflation targeting programmes require a more responsive aggregate demand to policy interest rate via retail bank rates (Bernanke and Gertler, 1995, 34).

The process concerning with the changes of policy interest rate into market and retail banking rate is defined as the interest rate pass-through. High degree and speed of transitivity from policy rate into money market and bank rates is called "high interest rate pass-through". High interest rate pass-through implies more effective inflation targeting policy, which controls the retail bank lending rates and subsequently total demand for achieving the inflation target. In the case of inefficient interest rate-pass through, the effect of any change in policy interest rate on aggregate demand via retail bank lending rate reduces and makes the implementation of inflation targeting hard.

After the stabilization policy based on a crawling exchange rate peg ended up with the liquidity crisis in 2001, ongoing inflation targeting policy was launched in Turkey. Inflation targeting has been implemented implicitly between 2002 and 2005. In the beginning of 2006, it has been explicitly decelerated by Central Bank that decisions on setting the policy interest rates would be made by Monetary Policy Committee in terms of the deviations from the inflation target (Kara, 2008, 5). Thus, the transition to the inflation targeting regime after 2001 has required the active use of short-term policy interest rates as the main monetary policy tool in Turkey.

From the points of view indicated above, this study aims to examine the effectiveness of interest rate-pass through in the framework of the Turkish Inflation Targeting. The structure of the paper is as follows. Section I presents the results of some empirical studies in related literature. Section II describes our econometric methodology, data and then reports the empirical results concerning with the degree and speed of interest rate pass through. Final Section concludes by determining the degree and speed of interest rate past-through and indicating the effectiveness of Turkish Inflation Targeting.

1 Literature Review

Since the 1990s, short-term policy interest rate has become as the main monetary policy instrument in parallel with the progressive shift towards inflation targeting regime in economies. Thus, the effectiveness of monetary policy also depends on the interest rate pass-through process that covers the degree and speed of retail bank interest rate adjustment to changes in policy-controlled interest rates. Accordingly, most of the studies on interest rate pass-through in the literature base their analysis upon the different types of cointegration methodology covering the relationship between official central bank or money market rates and retail bank rates.

Regarding the cross-country studies, Sander and Kleimeier (2004), investigated the interest rate pass-through process for ten different loan and deposit rates in euro-zone countries over the period from January 1993 until October 2002. Their data set basically consisted of overnight money market rate as a proxy for the monetary policy stance and the market interest rate with the highest correlation with the respective retail lending or deposit rate as a proxy for the cost of funds. One of their significant empirical results is that the pass-through has become faster in response to monetary policy impulses but not in response to changes in cost of funds. They also indicated that national characteristics are still important pass-through determinants while monetary policy will continue to operate in a heterogeneous euro zone.

De Bondt (2005) also examined the interest rate pass-through at the euro area level for the sample period from January 1996 to May 2001. His focus was on the pass-through of official interest rates, approximated by the overnight interest rate, to retail bank deposit and lending interest rates. Empirical results, on the basis of a vector error-correction and vector autoregressive model, suggested that quicker retail bank interest rate pass-through process in the euro area since the introduction of the euro. Pass-through of official interest to market

interest rates is complete for money market interest rates up to three months, but not for market interest rates with longer maturities.

Including the expected monetary policy matters, Kwapil and Scharler (2009) explored empirically to what extent banks take policy interest rates into account when setting retail banking lending rates in the U.S (1968-2006), the U.K. (1973-2006) and Germany (1972-1998). They found that the more monetary policy regime shifts towards inflation targeting, the more the expected monetary policy becomes important as a determinant of bank lending rates in the U.S. and the U.K. and to a limited extent also in Germany. Thus, their results provided a support for the hypothesis that monetary policy has become more effective by successfully influencing lending rates. Moreover, they indicated that monetary policy becomes more powerful if it has a faster and stronger transmission to retail bank's rates.

For three small open economies in South East Europe, Petrevski and Bogoev (2012) investigated the effectiveness of the interest rate channel during the period 1999-2010 for Bulgaria, 2000-2010 for Croatia and 1999-2010 for Macedonia. They examined the size and speed of adjustment of bank lending rates to the changes in money market rates. The results based on various cointegration methods suggested that there is a long-run equilibrium relationship between money market rates and some of the lending rates. The short-run adjustment of lending rates to changes in the money market rate is quite low, implying that the effectiveness of domestic monetary policy through the interest rate channel is quite limited for the small economies in South East Europe.

The relationship and adjustment degree between policy rate and banking retail rates are also highly examined under the concept of interest rate pass-through for the case of individual countries. The interest rate pass-through process in Portugal has been examined by Rocha (2012) with employing cointegration analysis and error correction modeling. Data set consist of interbank rate and retail bank rates including deposit rate and lending rate between 1991 and 1998. Findings reveal a rigid adjustment of bank rates implying that monetary policy actions will be slowly transmitted through bank retail rates. That means monetary policy will take longer to produce its final effects on aggregate demand and eventually prices in Portuguese economy.

Ahmad et. al. (2013) examined the short-run and long-run dynamics of interest rate pass through by using error correction methodology for the monthly data belongs to period 1999 – 2009 in United Kingdom. While the LIBOR was used as a proxy for the policy rate, retail rates consist of instant deposit rate, time deposit rate, secured lending rate and mortgage

rate. The empirical results revealed that the UK banking system adjusts its retail interest rates in response to the changes in the LIBOR completely in the long-run, while adjustment in the short-run is found to be incomplete. They consequently argued that incomplete short-run pass-through might hinder the potency of the monetary policy in United Kingdom.

Concerning with the key role in determining the effectiveness of inflation targeting policy, the interest rate pass-through from official to retail loan rates in Turkey has been studied by some economists. Using monthly data covering the period June 2001-September 2005 in a linear panel data setting, Aydin (2007) analyzed the interest rate pass-through from the money market rate as a proxy of the official rate to corporate, housing, cash and vehicle loan rates. The empirical results revealed that housing loans are the most responsive rates to changes in the policy rate while cash and vehicle rates are less responsive. Commercial loans were found to be adjusting incompletely. In conclusion, Aydın indicated that the monetary policy rate can be used to control credit driven demand as an instrument of inflation targeting.

Çavuşoğlu (2010) analyzed the interest rate pass-through in Turkey for two periods from 2002 - 2009 and 2004 – 2009 by using Vector Auto Regression and Cointegration Analysis. Monthly data consist of Central Bank overnight borrowing interest rate as reference policy interest rate and retail bank of lending and deposit rates. The study concludes that Central Bank can affect banking interest rates by changing policy rates for two periods although there are differences in degree and speed of interest rate pass through between the periods 2002-2009 and 2004-2009. Ibicioğlu (2012) also examined the effect of the overnight lending facility of the Central Bank of the Republic of Turkey as a policy rate on consumer loan interest rates for housing, automobile and cash. By using Vector-Autoregressive Methods including Variance Decomposition and Impulse-Response Function for the monthly data between 2002 and 2012, Ibicioğlu showed that the effects of the policy rate on all of the consumer credit interest rate are high. Ibicioğlu also indicated that policy makers can use actively the tool of the policy rate for controlling demand for consumer loans.

By considering with the nonlinearity in the responses of corporate, housing, cash and automobile loan rates following money market rate changes, Yıldırım (2012) investigated the interest rate pass-through mechanism in Turkey. Accordingly, Yıldırım employed Threshold Autoregressive (TAR) and Momentum Threshold Autoregressive (MTAR) models for cointegration analysis on the monthly data set from November 2002 to October 2011. Data comprises the overnight money market rate as a proxy for the monetary policy stance and lending rates for consumer, vehicle, housing and corporate loans. Empirical results supported

the validity of the weak exogenity assumption of the money market rate to loan rates by indicating incomplete pass-through. Similarly, Yüksel and Özcan (2013) also investigated the interest rate pass-through of monetary policy rate to banking retail rates in Turkey by employing the asymmetric Threshold Autoregressive (TAR) and Momentum Threshold Autoregressive (MTAR) procedures. Data set consist of cash, vehicle, housing and commercial loan rates as retail rates and interbank overnight borrowing interest rate as the policy rate over the period December 2001 to April 2011. The empirical results indicated a significant and complete pass-through between policy rate and loan rates. They concluded that Central Bank can affect the aggregate demand by using policy rates through loan rates.

2 Methodology, Data and Empirical Results

In Turkey, the transition to the inflation targeting regime since the February 2001 crisis has required the active use of short-term interest rates as the main policy tool in order to demand and expectations management. Given the fact that banks are the dominant source of intermediated credit for household and firms in Turkey, controlling the supply of retail bank credit by policy interest rate arrangement is apparently the best way to manage total demand. Thus, both degree and speed of interest rate pass-through at which changes in the central bank policy rate are transmitted to retail rates faced by firms and households are crucial for the effectiveness of inflation targeting policy in Turkey.

With this perspective, this section of study investigate the degree and speed of interest rate pass-through from policy rate to retail banking by adopting a single equation Error Correction Model over the period from January 2002 to December 2013. A large volume of empirical research in literature employed Error Correction Methodology (ECM) on the banks price setting procedure while analyzing how changes in central banks' policy rates transmit to retail interest rates on loans. Accordingly, this study also employs a symmetric single Error Correction Model following marginal cost pricing model equation:

$$LR_t = \lambda + \beta\, PR_t \tag{1}$$

where LR is the interest rate set by retail bank for their clients, PR is the policy rate, λ is a mark up, and β measures the degree of pass-through. If markets are perfect and banks risk-neutral, β would equal 1, implying complete pass- through. When the series of interest rates

(LR and PR) are *I* (1) and cointegrated, following single equation Error Correction Model can be formulated:

$$\Delta LR_t = \mu + \sum_{i=1}^{n} \theta_i \, \Delta LR_{t-1} + \sum_{i=0}^{n} \alpha_i \Delta PR_{t-1} + \Upsilon \, (LR_{t-1} - \lambda - \beta PR_{t-1}) + \varepsilon_t \qquad (2)$$

where β estimates the long term affect that a one unit increase in PR has on LR. This long term effect will be distributed over future time periods according to the rate of error correction Υ. Thus, β represents the degree of interest rate pass-through while Υ represents the speed of interest rate pass-through. For each retail lending rate, the single equation Error Correction Model above can be utilized to identify the degree and the speed of pass-through.

Before we analyze the degree and speed of interest rate pass-through in a Turkish context adopting a single equation Error Correction Model above, we should test whether interest rate set consisting of retail bank (LR) and policy rate (PR) are **I**(1) and cointegrated. Our data set includes the overnight money market rate as a proxy for the policy interest rate (PR), and the retail lending rates (LR) for household and firm including cash (CAR), vehicle (VR), housing (HR) and corporate (COR) loan rates. All data series are provided from Electronic Data Delivery System of Central Bank of the Republic of Turkey covering the period from January 2002 to December 2013.

Using both the Augmented Dickey-Fuller Test (ADF) and the Phillips-Perron Test (PP), we ascertained the level of integration of the series presented in Table 1.The results of both test indicates that all the series are stationary in their first differences, **I**(1), at 1% significance levels while the variables are non-stationary in their levels.

Table 1. Results of Unit Root Test for Time Series

Variables	Augmented Dickey Fuller (ADF)		Philips Peron (PP)	
	Level	Firs Difference	Level	Firs Difference
PR (policy rate)	-0.867 (0.301)	-5.544 (0.000)*	-1.177 (0.229)	-5.720 (0.000)*
CAR (cash)	-0.942 (0.273)	-5.662 (0.000)*	-1.332 (0.147)	-6.752 (0.000)*
VR (vehicle)	-1.064 (0.221)	-5.898 (0.000)*	-1.235 (0.188)	-6.580 (0.000)*
HR (housing)	-1.102 (0.213)	-6.947 (0.000)*	-1.200 (0.201)	-5.801 (0.000)*
COR (corporate)	-0.792 (0.362)	-4.322 (0.000)*	-1.268 (0.168)	-5.986 (0.000)*

Note: p-value in parentheses. *, represents the statistical significance level of 1%

We test for cointegration between each individual lending rate and the policy interest rate using the Johansen Procedure. The results from the cointegration test in Table 2 shows

that both Trace and Maximum Eigenvalue Tests reject the null of zero cointegrating vectors while the hypothesis that there is one cointegrating vector cannot be rejected. Thus, the results of cointegration test are in favor of long co-movement between policy rate and the interest rates of retail bans for cash, vehicle, housing and corporate loan.

Table 2. Results of Johansen Test for Cointegration

Variables	Maximum Eigenvalue Test		Trace Test	
	r=0	r=1	r=0	r≤1
CAR (cash)	48,32 (0,023)**	2,15 (0,257)	50,46 (0,018)**	3,26 (0,201)
VR (vehicle)	76,21 (0,034)**	3,40 (0197)	78,90 (0,024)**	5,40 (0154)
HR (housing)	94,13 (0,028)**	2,90 (0,147)	97,23 (0,021)**	4,32 (0,118)
COR (corporate)	34,25 (0,019)**	2,74 (0,297)	36,95 (0,013)**	4,74 (0,110)

Note: p-value in parentheses. r is the number of co-integrating vectors.

** denotes the rejection of the null hypothesis of no co-integrating vector at the 5% level.

Having established cointegration or a long-run relationship between each lending rate and the policy rate, we next turn to focusing on the degree and speed of this relationship. In other words, we now move to estimating the degree and speed of pass-through from policy interest rate to each lending rate in the framework of ECM. The results of symmetric single equation ECM based on Equation 2 for each lending rate are shown in Table.3. Explanatory power of the models (Adj R^2) and the statistical significance of their regression coefficients (β and ϒ) are appropriate. Results of the Breusch-Godfrey LM Test and White test also indicate that there is no serial correlation and no heteroscedasticity, respectively.

Table 3. Error Correction Model Estimation

	CAR (cash)	VR (vehicle)	HR (housing)	COR (corporate)
Degree of Pass-Through (β)	1,23 (0,013) **	1,09 (0,029)**	1,01 (0,031)**	0,67 (0,017)**
Speed of Pass-Through (ϒ)	-0,47 (0,024) **	-0,44 (0,014)**	-0,54 (0,025)**	-0,61 (0,013)**
Adj R^2	0.78	0.67	0.71	0.54
Breusch-Godfrey LM Test	(0,658)	(0,458)	(0,741)	(0, 395)
White Test	(0,197)	(0,175)	(0,244)	(0, 293)

Note: p-value in parentheses, * *, represents the statistical significance level of 5%

The coefficient β symbolizes the degree of long term pass-through and indicates a complete pass-through when it equals one (β =1). This means that, in the long run, a change in the policy interest rate is fully transmitted to the lending rate. For all lending rates, the long-run pass-through coefficient is above 1 except corporate lending rates. That means that the degree of interest rate pass-through of changes in the policy rate to the lending rates of Cash, Vehicle and Housing are than more complete in the long run while incomplete for only lending rates of Corporate.

The coefficient Υ indicates the speed of adjustment of the short-run dynamics to the long-run equilibrium relationship. As indicated by the speed of adjustment coefficients for all lending rates, the pass-through is naturally incomplete in the short-run. However, the short-run speed of adjustment coefficients (Υ) indicates that 61 percent of any disequilibrium in the long-run is corrected within a one-month period for the loan rates of corporate while 54, 47 and 44 percent for the loan rates of housing, cash and vehicle, respectively. Thus, it can be concluded that short-run speed of the pass-through of the policy interest rate to the bank's rates is quite high.

Conclusion

It is widely accepted that the policy interest rate as a basic tool of inflation targeting regime to control credit driven demand can only operate perfectly when banks properly transmit the changes in the central bank policy rate to their customers' interest rates. In other words, the interest rate pass-through process that covers the degree and speed of retail bank interest rate adjustment to changes in policy-controlled interest rates has a crucial in determining the effectiveness of inflation targeting policy. With this perspective, the study focused on how changes in the policy interest rate are transmitted to the interest rates of the banking sector in Turkey after adopting Inflation Targeting Regime in 2001.

After applying a single equation Error Correction Model for the monthly data over the period from January 2002 to December 2013, empirical results reveal that policy rate has a considerable impact on retail banking rates. As regarding the degree of the pass-through, it appears that changes in policy rates highly transmit to the lending rates in the long-run for the all kinds of loan except corporate rate. The speed of the interest rate pass-through monthly is also quite high for all retail bank rates. Consequently, central bank has a control over banking rates by showing its effect within a month highly good enough. Thus, the findings of study

indicate that Central Bank of the Republic of Turkey has a suitable monetary transmission mechanism in order to use policy interest rate to control credit driven demand and eventually prices in the framework of inflation targeting regime.

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