THE EFFECT OF THE CENTRAL BANK LENDING RATE ON CONSUMER LOAN INTEREST RATES: AN EMPIRICAL INVESTIGATION

MERKEZ BANKASI BORÇ VERME FAİZ ORANLARININ TÜKETİCİ KREDİSİ FAİZ ORANLARI ÜZERİNDEKİ ETKİSİNİN AMPİRİK ANALİZİ

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ABSTRACT

The purpose of this study is to analyze the effect of the central bank lending rate on consumer loan interest rates by using some econometric methods. The analyses were realized with monthly frequency data belonging to period 2002:1-2012:1. At the end of analyses, it is observed that the effect of the central bank lending rate on consumer loan interest rates is high with a certain lag in Turkey. When types of consumer loan are examined in detail, the central bank lending rate is captured to be more effective on housing, cash and automobile loan interest rates respectively.

ÖZET

Bu çalışmanın amacı, merkez bankası borç verme faiz oranlarının bankalar tarafından kullandırılan tüketici kredisi faiz oranları üzerindeki etkisini ekonometrik yöntemler kullanarak analiz etmektir. Analizler 2002:1-2012:1 dönemine ait aylık frekansta veri seti kullanılarak gerçekleştirilmiştir. Analizler sonunda Türkiye'de Merkez Bankası borç verme faiz oranının tüketici kredisi faiz oranlarını etkileme gücünün belirli bir gecikme ile yüksek olduğu görülmüştür. Tüketici kredisi türleri açısından bakıldığında borç verme faiz oranlarının sırasıyla konut, taşıt ve nakit krediler üzerinde etkili olduğu sonucuna ulaşılmıştır.

Consumer loan interest rates, Lending rate, Variance decomposition, Impulse-response analysis.

Tüketici kredisi faiz oranları, Borç verme faiz oranı, Varyans ayrıştırması, Etki-tepki analizi.

JEL Classification: E43, E52, G21.

1. INTRODUCTION AND LITERATURE

Consumer loan is one of the most important financial products that allow consumers to meet their current consumption expenditure. One of the most important cost items of consumer loan is interest rate. If policy maker institutions want to control demand for consumer loan, one of the methods applied is to change the central bank lending rate.

Interest rates can influence the real economy through three main mechanism channels. The first one is the substitution effect. The reaction of companies and households depends on the magnitude of the substitution effect, i.e. the change in the relative costs of alternative credit and deposit possibilities. The second is known income effect. Changes in the interest rates alter the costs and incomes of economic agents and, consequently, their net income. Finally, they affect the value of real and financial assets and, therefore, the wealth of companies and households (wealth effect). Changes in central bank interest rates are passed through to changes in banks' yields determines the power of these effects to a great extent. Thus, the effectiveness of monetary policy depends on the degree and speed of interest rate adjustment to changes in policy-controlled interest rates Horvat et al. (2004).

The high sensitivity of the consumers against interest rate has been determined by academic studies done in the various countries. Magri (2002), Tudela and Young (2005), Nieto (2007), Ibicioglu and Karan (2010) have found that there are strong relationship between loan interest rate and demand for loan. The central banks, one of the policy maker institutions, try to control loan interest rates by employing tools such as reserve requirements and lending rates. The primary monetary policy tool is the short term lending rate since the implementation of the inflation targeting regime, 2002, in Turkey.

No doubt, banks also take into consideration some other factors in determining the interest rates other than central bank lending rates. However, the lending rate applied by the central banks is considered to be one of the primary determinants of the loan rates. There are many studies focusing on the effect of money market or/and official interest rates on the consumer loan interest rates. It has been shown in the literature that becuase of the structure, competition, and concentration of the banking sector, level of bank intermedia-tion, availability of alternative sources of finance, and monetary policy regime, the speed and extent of the pass-through of money market rates to retail bank rates are fifferent from country to country Cottarelli and Kourelis (1994), Mojon (2000), Sander and Kleimeier(2004a). Studies BIS (1994), Borio and Fritz (1995) for 12 industrialised countries, Manzano and Galmes (1996) for Spain, Winker (1999) for Germany, Pedroni (1999) show that changes in money market rates are not fully reflected in short-term bank lending rates to enterprises after three months, but that the pass-through is higher in the long term. Recent individual and cross-country studies by Kleimeier and Sander (2000), Donnay and Degryse (2001) for 12 European countries, Toolsema et al. (2001) for Belgium, France, Germany, Italy, the Netherlands and Spain, Bredin (2001) for Irish, Burgstaller (2003) for

Austrian, Horvat et al. (2004) for Hungary, Sorensen and Werner (2006) for Euro areas countries and Aydin (2007) for Turkey find that the passing-through of the central bank lending rate to retail banks loan rate is high but not completed. Hofmann (2000) and Mojon (2000) also find short-term sluggishness in short-term bank lending rates to enterprises, but assume a priori a complete long-term pass-through. Most of these studies, the vector autoregressive (VAR) method tools such as impuls respons and variance decomposition, have been used. Consequently, the most of the empirical results show that the degree and speed pass-through are different across retail rates and countries.

The motivation of this study is to analyze the effect of the Central Bank of the Republic of Turkey (CBRT) lending rate on consumer loan interest rates in the context of the inflation targeting regime implemented. In line with this, the lag structure of the pass-through and variation among different consumer loans are investigated for Turkey. Investigated period, sample size and methods employed differentiate this study from the similar ones. The plan of the rest of the paper is as follows. In section 2, the method, variables and data set are explained. The findings are given in section 3 and Section 4 concludes.

2. METHOD AND DATA SET

Variance decomposition and impulse-response function, types of vector-autoregressive method, are used for analyses. Variance decomposition analysis tells how much of a change in a variable is due to its own and how much due to other variables. If the major part of the change in a variable is due to its own shock, this situation indicates that this variable is acting as external (Enders, 1995). It offers a slightly different method for examining VAR system dynamics. It gives the proportion of the movements in the dependent variables that are due to their 'own' shocks, versus shocks to the other variables. A shock to the ith variable will directly affect that variable of course, but it will also be transmitted to all of the other variables in the system through the dynamic structure of the VAR. Variance decompositions determine how much of the s-step-ahead forecast error variance of a given variable is explained by innovations to each explanatory variable for s = 1, 2, . . . In practice, it is usually observed that own series shocks explain most of the (forecast) error variance of the series in a VAR. To some extent, impulse responses and variance decompositions offer very similar information (Brooks, 2008).

Impulse-response is a method which is used to analyze the variables' reaction (what direction and what extent) to shock of error terms of variables in the model. More generally, an impulse response refers to the reaction of any dynamic system in response to some external change. Impulse responses trace out the responsiveness of the dependent variables in the VAR to shocks to each of the variables. So, for each variable from each equation separately, a unit shock is applied to the error, and the effects upon the VAR system over

time are noted. Thus, if there are g variables in a system, a total of g^2 impulse responses could be generated (Brooks, 2008).

The analyses were realized on the totally 121 observations belonging to period 2002:1-2012:1, monthly frequency. Four variables are used in the scope of the analyses. The first variable is overnight lending facility of CBRT. The other variables are interest rates for housing, automobile and cash loans which are types of consumer loan. All data have been obtained from the CBRT internet page (CBRT, 2012).

3. EMPIRICAL RESULTS

First of all, that whether the series of the variables are stationary or not is tested by using Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) methods. The results of stationary test are presented in Table 1. In the table, it is seen that all of the variables are non-stationary for the same level in the two separate models, constant and constant-linear trend according to tests of the ADF and PP (except the automobile for the constand model according to PP test) on the statistical significance level of 1%.

Table 1: Stationary test results (level)

	ADF		PP	
	Constand	**Constand and Lineer Trend**	**Constand**	**Constand and Lineer Trend**
CBRT	-2,2148 (0,2022) [3]	-2,2726 (0,4451) [1]	-3,3892 (0,0132) [3]	-1,9883 (0,6014) [6]
Housing	-1,8415 (0,3589) [4]	-3,0433 (0.1251) [1]	-2,5505 (0,1063) [1]	-1,8411 (0,6785) [4]
Automobile	-2,0365 (0,2710) [4]	-1,3014 (0,8827) [4]	-3,4852*** (0,01) [3]	-3,4113 (0,0547) [2]
Cash	-2,7480 (0,0691) [3]	-2,6905 (0,2425) [1]	-3,4799 (0,0102) [3]	-2,903 (0,1653) [1]

MacKinnon (1996) one-sided p-values. [ ] lag lengths for models. H_0: Series is non-stationary. (ADF-PP)
***, represent the statistical significance level of 1%.

If the variables are non-stationary in their levels, it should be made stationary by taking the differences of them. After taking first differences of variables, ADF and PP tests were repeated and the results are presented in Table 2. It is seen in the Table 2 that all variable are stationary in their first differences I(1) according to both ADF and PP test results.

Table 2: Stationary test results (first difference)

	ADF		PP	
	Constand	**Constand and Lineer Trend**	**Constand**	**Constand and Lineer Trend**
d(CBRT)	-7,9723*** (0,0000) [0]	-8,7711*** (0,0000) [0]	-8,3919*** (0,0000) [6]	-8,9864*** (0,0000) [5]
d(Housing)	-8,3154*** (0,0000) [0]	-8,6941*** (0,0000) [0]	-8,4140*** (0,0000) [1]	-8,6293*** (0,0000) [4]
d(Automobile)	-8,4524*** (0,0000) [1]	-8,9797*** (0,0000) [1]	-8,9939*** (0,0000) [1]	-9,1422*** (0,0000) [3]
d(Cash)	-7,7123*** (0,0000) [1]	-8,4229*** (0,0000) [1]	-7,4156*** (0,0000) [3]	-7,7318*** (0,0000) [6]

MacKinnon (1996) one-sided p-values. [ ] lag lengths for models. H_0: Series is non-stationary. (ADF-PP)
***, represent the statistical significance level of 1%.

Before variance decomposition, lag orders were accounted. The lag order is taken as 1 according to Schwarz Information Criteria. The variables are ordered from external to internal as central bank lending rate and consumer credit. The results of the variance decompositions are presented Table 3, 4 and 5. As seen table 3; 3,48% of the change in housing interest rate is explained initially by the central bank lending rate. This is 42,59% and 45,79% for the second and third period respectively and going on approximately on this level for the following period.

Table 3: Variance decomposition of d(housing loan interest rate)

Period	S.E.	d(CBRT)	d(housing)
1	1,32	3,48	96,52
2	1,71	42,59	57,41
3	1,76	45,79	54,21
4	1,77	46,10	53,90
5	1,77	46,12	53,88
6	1,77	46,13	53,87
7	1,77	46,13	53,87
8	1,77	46,13	53,87
9	1,77	46,13	53,87
10	1,77	46,13	53,87
11	1,77	46,13	53,87
12	1,77	46,13	53,87

When looked at the automobile loan interest rate, 3,96% of the change in automobile interest rate is explained initially by the change of the central bank lending rate. This is 39,01% for the second period and keeps approximately on this level for the following periods.

Table 4: Variance decomposition of d(automobile loan interest rate)

Period	S.E.	d(CBRT)	d(automobile)
1	1,68	3,96	96,04
2	2,11	39,01	60,99
3	2,15	40,74	59,26
4	2,15	40,86	59,14
5	2,15	40,87	59,13
6	2,15	40,87	59,13
7	2,15	40,87	59,13
8	2,15	40,87	59,13
9	2,15	40,87	59,13
10	2,15	40,87	59,13
11	2,15	40,87	59,13
12	2,15	40,87	59,13

The last one is the cash loan interest rate. 4,95% of the change in the cash loan interest rate is explained initially by the change of the central bank lending rate. This is 39,13% and 42,72 for the second and third period respectively. There is little increase in the next periods.
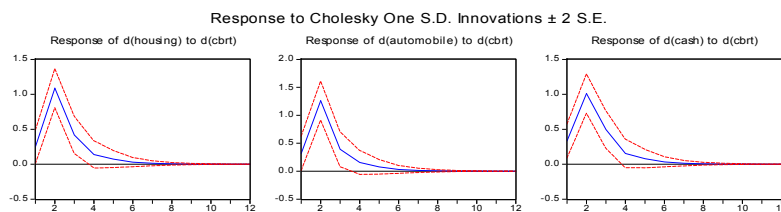
Table 5: Variance decomposition of d(cash Interest loan interest rate)

Period	S.E.	d(CBRT)	d(cash)
1	1,35	4,95	95,05
2	1,71	39,13	60,87
3	1,77	42,72	57,28
4	1,78	43,31	56,69
5	1,78	43,42	56,58
6	1,78	43,43	56,57
7	1,78	43,44	56,56
8	1,78	43,44	56,56
9	1,78	43,44	56,56
10	1,78	43,44	56,56
11	1,78	43,44	56,56
12	1,78	43,44	56,56

These results may be interpreted that the banks reflect the changes of the central bank lending interest rate to consumer credit interest rate approximately with a lag of 2 months. In addition, it is observed that the most affected type of consumer credit is housing loan interest rate with a lag of 2 months. Housing loan is followed respectively by cash and automobile loans.

After variance decomposition analysis, impulse-response analysis was applied and the results of that were presented in Graph 1. The response of the consumer loan interest rates to shock originated in the central bank lending rate are positive and get maximum especially after second period.

Graph 1: Impulse-response result

Response to Cholesky One S.D. Innovations ± 2 S.E.

4. CONCLUSIONS

In this study, the effect of the central bank lending rate on the housing, automobile and cash loan interest rates is investigated with variance decomposition and impulse-response methods by using data for the period 2002:1-2012:1.

At the end of the analyses, it is seen that the effect of the central bank lending rate on consumer credit interest rate is high with a lag but not completed. In this respect, the results likes to findings of the Manzano and Galmes (1996), Winker (1999), Pedroni (1997), Horvat et al. (2004), Sorensen and Werner (2006) and Aydin (2007). It is observed that the most affected types of consumer credit are housing, cash and automobile loan interest rate respectively with a lag of 2 months approximately. The response of consumer loan interest rates to shock originated in the central bank lending rate are positive and become maximum especially after second period.

These results are thought to be important for policy makers. When the economy is overheated, in the periods of increased debt burden of consumers or when systematic risk increase because of credit expansion, policy makers can use actively the tool of the central bank lending rate for controlling demand for consumer loans.

REFERENCES

1. Aydin H., I., 2007. Interest Rate Pass-Through in Turkey, Research and Monetary Policy Department, Working Paper No:07/05, The Central Bank of the Republic of Turkey.

2. BIS (Bank for International Settlements), (1994). National Differences in Interest Rate Transmission, March, Basle

3. Borio, C.E.V., Fritz, W., 1995. The response of short-term bank lending rates to policy rates: a cross-country perspective, BIS Working Paper, No:27.

4. Bredin, D., T. Fitzpatrick, and O Reilly, G. 2001. Retail Interest Rate Pass-Trough: the Irish Experience, Central bank of Ireland, Technical paper 06/RT/01.

5. Brooks, C. (2008). Introductory Econometrics for Finance, Second Edition,The ICMA Centre, Cambridge University Press, UK.

6. Burgstaller, J. 2003. Interest rate transmission to commercial credit rates in Austria, Johannes Kepler University of Linz, Working Paper, No. 0306.

7. CBRT, 2012. http://www.tcmb.gov.tr/yeni/eng/dokuman_eng.php.

8. Cottarelli, C., Kourelis, A., 1994. Financial structure, bank lending rates and the transmission mechanism of monetary policy. IMF Staff Paper, No. 41, pp. 587-623.

9. Donnay, M. and Degryse, H., 2001. Bank lending rate pass-through and differences in the transmission of a single EMU monetary policy, Discussion Paper, Center for Economic Studies, K.U. Leuven, 01.17.

10. Enders, W. 1995. Applied econometric time series. John Wiley & Sons, Inc., New York.

11. Horvath, C., Kreko, J., Naszodi, A., 2004. Interest Rate Pass-Through: the Case of Hungary, Magyar Nemzeti Bank, Working Paper, 8.

12. Ibicioglu M., Karan M. B. 2009. The Effect of Interest Rates on Consumer Credit in Turkey. Journal of BRSA Banking and Financial Markets, 2009, vol. 3, issue 2, pages 11-30.

13. Kleimeier, S., Sander, H., 2000. Asymmetric adjustment of commercial bank interest rates in the euro area: implications for monetary policy, Paper Presented at the Conference Financial Structure, Bank Behavior and Monetary Policy in the EMU, Groningen 5-6 October.

14. Magri, S., 2002. Italian Households' Debt: Determinants Of Demand And Supply, Temi di Discussione No. 454, Banca D'Italia.

15. Manzano, M., C., Galmes, S., (1996). Credit Institutions Price Policies and Type of Customer: Impact on the Monetary Transmission Mechanism. Banco de España, Documento de Trabajo, No: 9605.

16. Moazzami, B. 1999. Lending Rate Stickiness and Monetary Policy Transmission: the Case of Canada and the United States, Applied Financial Economics, 9, 533-538.

17. Mojon, B. 2000. Financial structure and the interest rate channel of ECB monetary policy, ECB Working Paper, No. 40.

18. Nieto, F., 2007. The Determinants Of Households Credit In Spain. Working Paper, No.0716, Bank of Espana

19. Pedroni, P., 1999. Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors, Oxford Bulletin of Economics and Statistics 61, 607-629.

20. Sorensen, C.K., Werner, T., 2006. Bank Interest Rate Pass-Through in the Euro Area: A Cross Country Comparison, ECB Working Paper, 580.

21. Toolsema, L.A., Sturm, J., E., De Haan, J., 2001. Convergence of monetary transmission in EMU: new evidence, CESifo Working Paper, 465.

22. Tudela, M., Young, G., 2005. The Determinants Of Household Debt And Balance Sheets In The United Kingdom, Working Paper, No. 266, Bank of England.

23. Winker, P., 1999. Sluggish Adjustment of Interest Rates and Credit Rationing: An Application of Unit Root Testing and Error Correction Modeling. Applied Economics, 31, 267-277.