İnsan ve Toplum Bilimleri Araştırmaları Dergisi
Journal of the Human and Social Science Researches
[2147-1185]

[itobiad], 2020, 9 (5): 3244/3263

The Effect of Interest Rate Corridor on Turkish Financial Markets

Faiz Koridoru Uygulamasının Türkiye Finansal Piyasaları Üzerindeki Etkisi

Musa BAYIR

Dr. Öğretim Üyesi, Bandırma Onyedi Eylül Üniversitesi, İİBF

Assist. Prof., Bandırma Onyedi Eylül University, Faculty of Economics and Administrative Sciences

musa.bayir@gmail.com

Orcid ID: 0000-0002-6877-4032

Nida ABDİOĞLU

Doç. Dr., Bandırma Onyedi Eylül Üniversitesi, İİBF

Assoc. Prof., Bandırma Onyedi Eylül University, Faculty of Economics and Administrative Sciences

nidaabdioglu@yahoo.com

Orcid ID: 0000-0002-8498-9893

Makale Bilgisi / Article Information

Makale Türü / Article Type : Araştırma Makalesi / Research Article
Geliş Tarihi / Received : 02.06.2020
Kabul Tarihi / Accepted : 26.10.2020
Yayın Tarihi / Published : 26.10.2020
Yayın Sezonu : Ekim-Kasım-Aralık
Pub Date Season : October-November-December

Atıf/Cite as: Bayır, M , Abdïoğlu, N . (2020). The Effect of Interest Rate Corridor on Turkish Financial Markets . İnsan ve Toplum Bilimleri Araştırmaları Dergisi , 9 (5) , 3244-3263 . Retrieved from http://www.itobiad.com/tr/pub/issue/57287/747107

İntihal /Plagiarism: Bu makale, en az iki hakem tarafından incelenmiş ve intihal içermediği teyit edilmiştir. / This article has been reviewed by at least two referees and confirmed to include no plagiarism. http://www.itobiad.com/

Faiz Koridoru Uygulamasının Türkiye Finansal Piyasaları Üzerindeki Etkisi

Öz

2008 finansal krizinin önce ABD ekonomisinde, ardından küresel ekonomide önemli sonuçları olmuştur. Bu durum, özellikle gelişmekte olan ülke merkez bankalarının para politikası uygulamalarında önemli bir değişim ortaya çıkarmıştır. Amerikan Merkez Bankası bu uygulamalara başvuran ilk para otoritesi olmuştur. Geleneksel olmayan para politikası olarak isimlendirilen bu uygulamalarla olağanüstü miktarda devlet tahvili ve mortgage teminatlı varlık alımı (mortgage- backed securities) yapılmıştır. Bunun bir sonucu olarak, küresel likidite düzeyi artmıştır. Böylece, Türkiye'deki finans kurumlarının yabancı likiditeye erişim olanakları ve ülkeye yabancı sermaye girişleri artmıştır. 2010 yılında, mevcut gelişmelerin bir gerekliliği olarak hem fiyat istikrarını hem de finansal istikrarı birlikte gözeten politika araçlarının tasarlandığı ifade edilebilir. Bu politika araçları, varlık ve kredi piyasasında yabancı sermaye dalgalanmaları sonucunda oluşabilecek riskleri önlemeyi amaçlamaktadır. Asimetrik faiz koridoru uygulaması bu süreçte uygulanan politika araçlarından biridir. Bu nedenle söz konusu politika aracı Merkez Bankası'nın finansal istikrar hedefi için önemlidir. TCMB bu politika aracıyla politika faiz oranını değiştirmeden kredi ve mevduat işlemlerini etkileme imkânı elde etmektedir. Böylece, aynı anda hem spekülatif sermaye girişleri hem de kredi piyasaları üzerinde etki oluşturma amaçlanmıştır. Dolayısıyla bu çalışmada, 2010:5-2018:5 yılları arasında uygulanan faiz koridorunun finansal piyasalardaki etkisi incelenmiştir. Koridorun üst sınırı, koridorun alt sınırı, BIST100, gecelik repo faizi ve dolar/ TL kuru çalışmada kullanılan değişkenlerdir. Analiz metodu olarak VAR tercih edilmiş ve analizler aylık frekansta veri ile gerçekleştirilmiştir. Ampirik sonuçlara göre, koridor alt sınırı gecelik repo faizini pozitif yönde, BİST100 endeksini negatif yönde etkilemektedir. Ayrıca koridor üst sınırının çalışmada kullanılan değişkenler üzerinde herhangi bir etkiye sahip olmadığı görülmüştür.

Anahtar kelimeler: Faiz koridoru, Borsa İstanbul, VAR, Para politikası, TCMB

The Effect of Interest Rate Corridor on Turkish Financial Markets

Abstract

The 2008 financial crisis had important consequences first in the US economy and then in the global economy. This has caused a significant change especially in the monetary policy practices of developing country central banks. The American Central Bank was the first monetary authority to apply for these practices. With these applications called as non-traditional monetary policy, an extraordinary amount of government bonds and mortgage-backed securities were made. As a result, the global liquidity level increased. Thus, foreign financial institutions having access to liquidity facilities and foreign capital inflows into the country has increased in Turkey. In 2010, as a necessity of the current developments, policy tools that monitor both price stability and financial stability were designed. These policy tools aimed to prevent the risks that might occur in asset and credit markets as a result of fluctuations in foreign capital movements. The asymmetric interest rate corridor is one of the policy tools that has been implied in this period. Therefore, this policy tool is important for the financial stability target of the Central Bank. With this policy tool, the CBRT has the opportunity to influence loan and deposit transactions without changing the policy interest rate. Thus, it is aimed to have an impact on both speculative capital inflows and credit markets at the same time. Accordingly, this study aims to investigate the effect of the asymmetric interest rate corridor, which is implied between 2010:5-2018:5, on financial markets. The upper limit of the corridor, the lower limit of the corridor, BIST100, the overnight repo rate, and the dollar / TL exchange rate are the variables considered in the empirical analyses. VAR is preferred as the analysis method and the analysis is carried out with data at monthly frequency. According to empirical results, the lower corridor positively affects the overnight repo rate and it affects the BIST100 index negatively. In addition, it is seen that the upper limit of the corridor has no effect on the variables used in the study.

Keywords: Interest rate corridor, Borsa Istanbul, VAR, Monetary policy, CBRT

Introduction

The financial crisis that emerged in the US economy in 2008 had important consequences. The unfavourable developments in the US financial markets also affected the real economic markets negatively. The economic crisis in the US economy rapidly spread to other countries and become a global economic crisis. In this period, important changes were made in the monetary policies of developed and developing countries and some implementations were applied which was resulted in extraordinary monetary expansion. Firstly, the conventional interest rate policy was tried to retain near zero. Since the expected impact was not obtained, some central banks made extraordinary monetary expansions by using unconventional policy tools such as the Federal Reserve (in December 2007), European Central Bank (in October 2008), The Bank of Japan (in December 2008) and Bank of England (in March 2009). Although there was a monetary expansion in the developed countries, international investors tended towards developing countries because of the increased global risk appetite. Some economic negations, such as unprovided recovery in financial markets, the debt crisis in some Euro area countries and recession in the Japanese economy, caused the increases in the applications of expansionary monetary policies. In addition, the global risk level was not decreased to the expected level. As a result, important fluctuations were seen in foreign capital movements in developing countries. These fluctuations affected the economic and financial situations of these countries. Central banks of developing countries, aiming to obtain price stability, were obliged to consider possible risks in their operations. In this process, central banks diversified their policy tools importantly by applying conventional interest rate policy with macroprudential policy tools. These new monetary policy tools aimed to prevent the risks that might occur in asset and credit markets because of fluctuations in foreign capital movements. These policy tools also aimed to stabilize the negative effects of external shocks.

After the 2008 financial crisis, conventional monetary policy was applied in Turkey to remove possible contractionary pressure. In 2010, extraordinary liquidity abundance occurred in global financial markets because of the monetary policy applications in developed countries. In the same period, the high level of short-term foreign capital inflow was seen in Turkey. The reasons behind this are the high growth rate in the Turkish economy, increased grade of credit rating agencies, fiscal discipline, and political stability in Turkey. Central Bank of the Republic of Turkey (CBRT) designed a new policy process in line with the economic conjuncture and announced its new policy in April 2010 as an exit strategy. This process can be summarised as the determination of a policy format which considers financial stability (CBRT, 2010, p. 11). Thus, the next period strategy of CBRT is to consider the increased financial risks in the economy. The policy tools concerning with the determined strategy were expanded as required reserves, reserve option mechanism and asymmetric interest rate corridor. Reserve requirement policy is one of the classical monetary policy tools that Central Banks use to regulate liquidity levels in the market. In this period, financial stability was aimed to be ensured with several reserve requirement implementations for foreign exchange and gold (Vural, 2013, 67-68). The reserve option mechanism provides banks to keep a certain percentage of their Turkish lira required reserves in foreign currency. The reserve options mechanism which was used during this period was aimed to achieve financial stability (Alper et al., 2012, 2). This study focuses on the asymmetric interest rate corridor which is among these policy tools.

In this study, the impact of asymmetric interest rate corridor on financial markets is investigated by considering its aim on foreign capital inflows. The main aim of the implementation of asymmetric interest rate corridor is to prevent risks which might affect financial stability by affecting the maturity of foreign capital inflows with liquidity management. Thus, the strength of the economy can be increased against fragility that might proceed from external balance, credit expansion, and capital movements (Kara, 2012, p. 5).

Interest Rate Corridor and Asymmetric Interest Rate Corridor Policy of CBRT

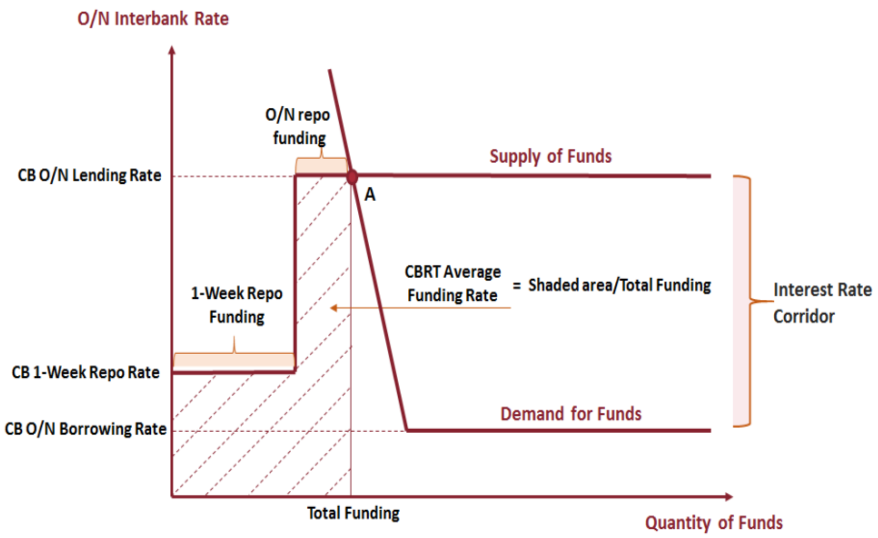
An increase in interest rate volatility is seen when financial fluctuations occur. In these periods, central banks should hold interest rates near policy interest rates and the bank should ensure smoothing of the return curve. In line with this goal, related literature considers different reserve policies and interest rate corridor implications (Whitesell, 2006, p. 1193). Among these implications, the interest rate corridor depends on the reserve management model under uncertainty created by Poole (1968). In the next periods, Woodford (2000) and Whitesell (2006) made an important contribution to the theoretical basis of the interest rate corridor. The interest rate corridor system considers the overnight credit allocation ratio offered by central banks in return for assurances and interest rates obtained from banks with keeping their deposits in central banks' balances in overnight maturities. The lending rate of interest should be determined above the policy rate of interest and liquidity is provided to banks at overnight maturity with this lending rate of interest. On the other hand, the borrowing rate of central banks should be below the policy rate of interest and it should ensure banks evaluate their excess reserves. The policy rate of interest is between these two rates of interest. The limit determined with lending and borrowing rate of interest around the policy rate of interest is named as interest rate corridor. Lending and borrowing rate of interests, explained around conventional monetary policies, ensure consistency of interest rate corridor automatically before the 2010 policy strategy. However, to evaluate the interest rate corridor as a policy tool, the corridor should be adjusted around certain aims (Berentsen *et al.*, 2008, p. 1070).

Monetary authorities have the opportunity to affect credit and deposits transactions using the interest rate corridor. In this case, they do not use any open market operation or do not change the policy interest rate. Thereby generated expansionary and contractionary effects equalize market interest rates to policy interest rates and thus instability in market interest rates is limited (Whitesell, 2006, p. 1183). The impact of the interest rate corridor system come true with two implication styles. Firstly, the space of the corridor is kept constant and it is moved to up and down. Secondly, the space of the corridor is changed (Berentsen *et al.*, 2008, p. 1072). In the first implication, expansionary effects occur by holding the corridor constant and moving it down. And contractionary effects occur when the corridor is moved up. In the second implication, expanding the corridor increases the uncertainty in the markets and thus credit terms are restricted. In contrast, the narrowing of the corridor reduces the uncertainty in the markets and eases the credit conditions. Therefore, banks' willingness to get credit reduces and in the meantime the difference between credit and deposits interest rate increases in economic constriction period. However, banks' willingness to get credit increases and the difference between credit and deposits interest rate decrease in the expansion period. Consequently, interest rate corridor implication affects the market uncertainty during the expansion and contraction periods. The changes in market uncertainty affect credit conditions. Thus, it decreases instability in market interest rates (Binici *et al.*, 2013, p. 3). The first interest rate corridor applications were as follows. The Reserve Bank of Australia, The Bank of Canada, the Reserve Bank of New Zealand and the Swiss National Bank made 50 basis points interest rate corridor implications between 1998 and 1999. Sveriges Riksbank made 75 basis points and The Bank of England made 100 basis points interest rate corridor implications in June 2001. The Federal Reserve Bank made 100 basis points interest rate corridor implication between 2003 and 2004. Lastly, after the 2008 financial crisis, most of the countries have used interest rate corridor implication as policy tools such as the European Central Bank, Japan, England, Canada, Australia, Indonesia, Turkey, Sweden, Switzerland, Norway, Poland, Romania, New Zealand, Hungary, Serbia and Iceland (Yücememiş *et al.*, 2015, p. 453).

Although CBRT's interest rate corridor implication after the 2008 financial crisis has similarities with other countries' in terms of operational aspect, it has important differences related to its targets. First, as in other countries' implications, the upper and lower bounds of the corridor are not equidistant to the policy interest rate. In addition, upper and lower bounds of interest rate corridor can be changed independently of each other. Because of these properties, CBRT's implication is named as asymmetric interest rate corridor. CBRT obtained a policy tool with an asymmetric interest rate corridor that aims both price stability and financial stability. In the periods when capital inflow increases, credits should be reduced for price stability and in the meantime value of the local currency should be appropriated to the economical bases. If the only policy interest rate is used in a monetary policy system, the increase in policy interest rate results in more foreign capital inflow and a more valued exchange rate. However, asymmetric interest rate corridor can affect credit and foreign exchange markets together as it is explained below (Kara, 2012, p. 7).

The process of asymmetric interest rate corridor of CBRT is shown in Figure 1. According to this Figure, the operational structure about asymmetric interest rate corridor implication is as follows. The upper and lower bound of the interest rate corridor consist of overnight lending and borrowing interest rates as in the standard interest rate corridor. On the other hand, the policy interest rate is determined as a one-week repo rate. The amount of funding that is made with the policy interest rate can be changed daily, and the market interest rate can be adjusted in the interest rate corridor and at the desired level. Overnight lending and borrowing interest rate ensure banks an opportunity to make overnight repo operations. One of the main features of the interest rate corridor system of CBRT is its opportunity to change the average funding cost without changing interest rates. In any day, either the absolute amount of funding needs of banks can be coverable with a weekly repo facility (in this case, the market interest rate is equal to the policy interest rate) or a lower amount of funding can be done. When all the necessities are not covered with weekly repo operations, banks might be obliged to benefit from the opportunity of overnight repo operations which provide more expensive funding opportunities. Thereby, the market-funding cost can be increased without making any changes in official interest rates (Binici *et al.*, 2016, p. 9). This system provides the opportunity to adjust the short-term interest rate in daily frequency, and with this feature, it provides important advantages in the periods when fast capital inflows and outflows occur (Kara, 2012, p. 8). The aim of the implication of asymmetric interest rate corridor is to reduce financial risks. These financial risks arise from foreign capital movements due to monetary expansion in developed countries and fluctuations in global risk appetite. In this context, in the first implications of the asymmetric interest rate corridor, the lower bound of interest rate corridor was changed. In more detail, because of the liquidity increase in developed countries in December 2010 and positive economic indicators in developing countries, foreign capital movements to Turkey was increased. Under these circumstances, CBRT reduced the lower bound of interest rate corridor. Thus, it aimed to behold overnight interest rates lower than the policy interest rate. Thereby, short-term capital inflows were aimed to be reduced by increasing downside volatility in overnight interest rates. In August 2011, global risk appetite was increased. This is due to the decline in global growth and the increased risk of public debt in some European countries. Because of the increase in global risk, there were foreign capital outflows in developing countries and financial risks have increased in the foreign exchange markets. In this case, the lower bound of interest rate corridor was increased. The CBRT has aimed at the reduction of short-term foreign capital outflows by limiting overnight interest rate volatility (CBRT, 2012, p. 47).

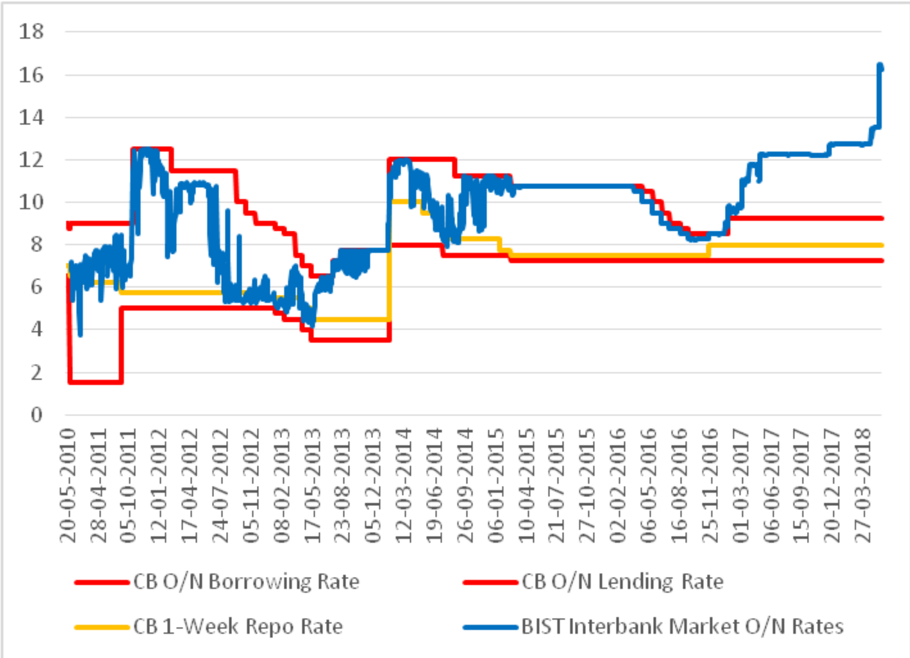
Figure 1. CBRT Operational Framework



Source: Binici et al., 2016, p. 8.

Figure 2 shows the asymmetric interest rate corridor strategy of CBRT. The Upper bound of interest rate corridor was started to use strongly beginning from the end of 2011. Accordingly, CBRT extended the upper bound of the interest rate corridor upward to create a contractionary pressure in credit markets (Yücememiş, *et al.*, 2015, p. 457). The implications after this period, bounds of interest rate corridor were continued to be adjusted independently from each other. Some indicators such as risk premiums related to the Turkish economy and global economy, developments in financial markets, domestic demand and internal-external balance were considered in doing this. Ultimately, in June 2018 simplification in monetary policy was done and turned back to the policy planning which is implied before 2010.

Figure 2. CBRT Interest Rate Corridor and BIST Interbank Market Rates (%)



Source: CBRT, 2019

In this context, the main aim of this study is to investigate the impact of the interest rate corridor tool, implied by CBRT to obtain price stability and financial stability together after the financial crisis, on financial markets. Some empirical studies examine the impact of CBRT's interest rate corridor policy on different economic variables. Tetik *et al.* (2015) investigate the impact of interest rate corridor on financial markets by using SVAR analyses during the periods 2009:1-2010:12 and 2010:12-2014:12. A positive relation is found between interest rates and the exchange rate. Gökalp (2016) examines the impact of the interest rate corridor on stock markets during 2010:5-

2014:11. They use event study and GMM methodologies. They report that the increases in the upper bound of the interest rate corridor decrease stock prices. When the impact on stock prices is examined for different industries, it is found that the upper bound of the interest rate corridor mostly affects the financial sector and services, manufacturing and technology industries follow it, respectively. Moreover, the increases in the lower bound of interest rate corridor result in decreases in stock prices. Kuzu (2017) uses the weighted average cost of funding as a proxy for interest rate corridor and it is investigated whether there is any relation between the interest rate corridor variable and different economic variables. By using GARCH analysis between the period 2011 and 2017 it is found that the interest rate corridor has positive relations with BIST 100 and BISTXBANK indices. Okatan (2019) finds a strong negative relation between interest rate corridor and stock prices for the period 2010-2017. Arıkan *et al.* (2018) investigate the effects of the interest rate corridor by VAR analysis between 2010:5-2016:01. According to the empirical results, the shocks that occurred in the lower bound of interest rate corridor affect the exchange rate and inflation. In addition, it is reported that domestic credit volume can be affected by expanding the lower and upper bound of the interest rate corridor. Yücememiş *et al.* (2015) show that the decisions about the interest rate corridor have impacts on inflation between 2003:1-2014:12.

Data and Methodology

The interest rate corridor, BIST overnight repurchase deposit rate, US dollar/TL exchange rate and BIST100 index are used in the model of the study. Although CBRT overnight lending and borrowing rates are available, they are not suitable for the vector autoregression (VAR) analyses. Gökalp (2016) uses credit and deposit interest rates as proxies for these overnight lending and borrowing rates. This can be explained with the findings of Kara (2012) who states that the upper bound of the interest rate corridor determines the loan rates of banks and the lower bound of interest rate corridor determines the interest rate on deposits. Following these findings, the individual loan rate of the banking industry is used instead of the lending rate. Moreover, the average interest rate on deposit accounts is used instead of borrowing rates.

BIST overnight repurchase deposit rate shows the market rate of interest that banks use overnight. So, this interest rate is used as an indicator in the market. Thus, it is expected to be one of the basic rates that are affected by the interest rate corridor. This variable should move in the same direction with upper and lower bounds of the interest rate corridor. In addition, the US Dollar/TL exchange rate and BIST100 index are added into the model since they reflect the foreign currency markets and stock markets, respectively.

Risk and liquidity level in global markets are effective in foreign capital movements in Turkey. When foreign capital inflows and outflows increase, the amount of funding is made by the CBRT more or less than the needs of the market. In this case, financial institutions satisfy the liquidity needs by selling-buying foreign currencies. As a result, the impact of capital outflow on the exchange rate is tried to be minimized. In the interest rate corridor system, the volatility of the interest rate is increased downwardly by expanding the interest rate corridor in the periods when capital flows are strong. In this way, it is promoted that the financial institutions obtain their liquidity needs from the central bank. As a result, the impact of foreign capital inflows on exchange rates is lessened. On the other hand, when capital flows are weak, the interest rate corridor is expanded upwardly and as a result, the volatility of interest rates is increased upwardly. In this way, financial institutions ensure their liquidity needs by selling their foreign currency assets. Hence, the impact of foreign capital outflows on exchange rates is reduced (Kara, 2012, p. 11). In line with the theory, a negative relationship is expected between the upper/lower bounds of the interest rate corridor and the US Dollar/ TL exchange rate. The last variable in the analysis is the BIST100 index. When the lower bound of interest rate corridor is expanded downwardly, the deposit rates decrease as well. Because of this, both local and foreign investors prefer to substitute investment tools. On the other hand, the upper bound of the interest rate corridor operates in the opposite direction. Thus, it is expected that the interest rate corridor should be effective on-demand of stocks that is one of the substitution tools (Gökalp, 2016, p. 1382). According to this theoretical background, a negative relationship is expected between the upper/lower bound of interest rate corridor and the BIST100 index. The relation between the dollar/TL exchange rate and the BIST100 index is also examined. The impact of the dollar/ TL exchange rate on stock prices is related to the export operations of the firms and the share of imports in their operations. If the increase in dollar/ TL results in an increase in the costs, the expected profits of the firms decrease and as a result, this affects stock prices negatively. If the increase in dollar /TL exchange rate makes the firm more advantageous in exports, expected profit increases and it affects stock prices positively. When the effect of stock prices on the dollar/ TL exchange rate is considered, it is seen that the increase in stock prices encourage foreign capital inflows to stock markets. It also might encourage local investors to sell foreign currency and buy stocks. A negative relation is expected between BIST100 and dollar/ TL exchange rates in both cases. Table 1 shows the variables used in this study.

Table 1. Variable Definitions and Data Sources

Variables	Definitions	Data Sources
Corridor lower bound	CBRT borrowing rate	CBRT
Corridor upper bound	CBRT lending rate	CBRT
Overnight repo rate	BIST overnight repo rate	CBRT, Borsa Istanbul
Dollar	Dollar/ TL Exchange rate	CBRT
Bist100	BIST100 Index	CBRT

Since the interest rate corridor was applied officially between 2010:5 and 2018:5, the analyses of this study include this period. Monthly data is used and Vector Autoregression (VAR) methodology is used in the study. Sims (1980) states that if there is a simultaneous relationship between variables in econometric models, all variables should be approached to the same extent. VAR methodology accepts all the variables as endogenous. In addition, the lagged values of the variables are added in the model and this is important in revealing dynamic relations between the variables (Asteriou *et al.*, 2007, p. 279). Bagliano and Favero (1998) state that the specified features of the VAR model provide an important advantage in analyzing the dynamic effects of policy shocks. Therefore, it was decided to use the VAR methodology.

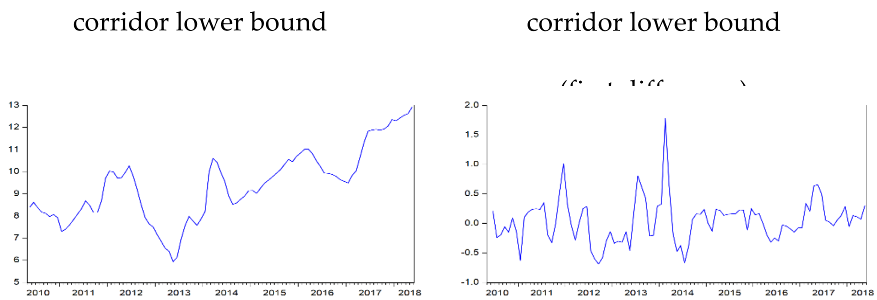
$$Y_t = \alpha_1 + \sum_{i=1}^{k} \beta_i Y_{t-i} + \sum_{i=1}^{k} \theta_i X_{t-i} + u_{1t} \qquad (1)$$

$$X_t = \alpha_2 + \sum_{i=1}^{k} \omega_i Y_{t-i} + \sum_{i=1}^{k} \gamma_i X_{t-i} + u_{2t} \qquad (2)$$

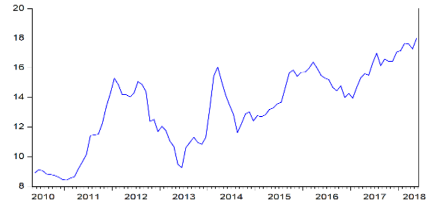
Equations (1) and (2) show the VAR model with 2 variables. k indicates the optimum lag length and u shows the error term. The error terms are important in the VAR analyses because they represent the shocks. The coefficients obtained from the VAR estimation are exceedingly difficult to interpret. Therefore, several methods have been developed. One of these methods is impulse response analyses and it shows the impact of a random standard deviation shock in error terms on the other variables' present and future values. Other methods, variance decomposition analysis shows at what rate the variance of the prediction error of a variable is explained by itself and from shocks on other variables.

Figure 3 shows the variables' level and first difference situations. According to this graph, the variables are not stationary at level but they are stationary at their first differences. Although these results are obtained from serial graphs, unit root tests of series are performed in Table 2.

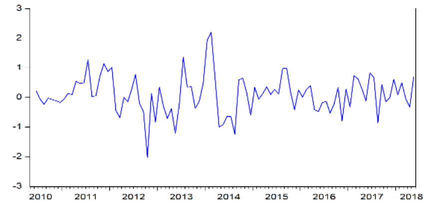
Figure 3. Serial Graphs



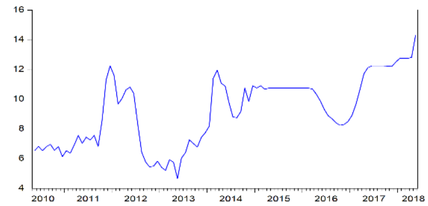
corridor upper bound



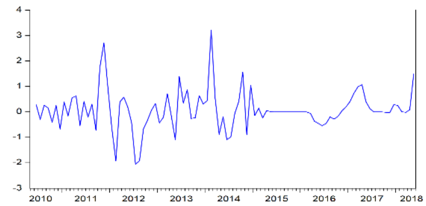
corridor upper bound



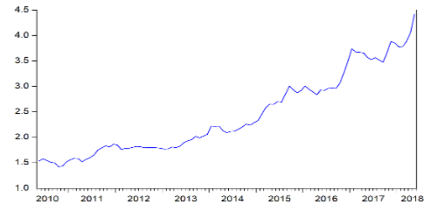
overnight repo rate



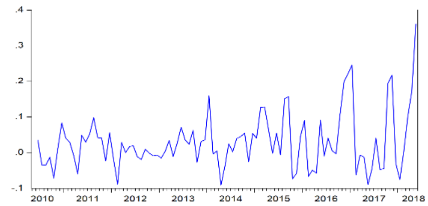
overnight repo rate



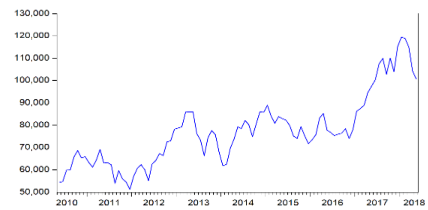
dollar



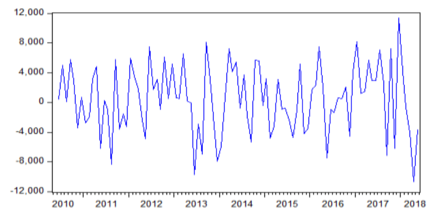
dollar (first difference)



bist100



bist 100 (first difference)



Empirical Results

The series must be stationary to make the predictions effective and consistent in time series analysis. The fact that time series is not stationary causes variables to move depending on time. Therefore, the problem of spurious regression arises, and the level of correlation between variables may be found more than expected. The most common method for investigating the stationarity of series is unit root analysis. Accordingly, the stationarity of the series is tested with Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests developed by Dickey and Fuller (1990) and Phillips and Perron (1990), respectively. According to the results, variables are non-stationary at the level. By having the first differences of the variables the series are made as stationary. In line with these results, estimations are made by the first differences of the variables.

Table 2. Unit Root Test Results

	ADF		PP	
Variables	**Constant**	**Constant+Trend**	**Constant**	**Constant+Trend**
corridor lower bound	-1.0148	-3.2234c	-0.8667	-2.2240
Δcorridor lower bound	-5.5718a	-4.4604a	-4.8145a	-4.8485a
corridor upper bound	-1.6182	-4.2220a	-1.4353	-2.4976
Δcorridor upper bound	-6.6977a	-6.6608a	-6.5012a	-6.4615a
overnight repo rate	-1.6895	-2.8749	-1.1007	-2.3551
Δovernight repo rate	-7.0592a	-7.0458a	-6.8416a	-6.8234a
dollar	1.6985	-0.9549	1.7941	-1.1131
Δdollar	-5.4473a	-5.8678a	-4.9552a	-5.1842a
bist 100	-0.5876	-4.3294a	-1.4572	-2.7657
Δbist 100	-3.5404a	-3.5462b	-9.1630a	-9.1064a

a, b, c show stationarity as %1, %5, %10 significance levels. Akaike Information Criteria (AIC) is used to determine lag lengths.

The optimum lag length for the model is determined before the VAR analysis. Since monthly data is used, the maximum lag length is chosen as 12. In line with the used information criteria, the optimum lag length is chosen as 2. Figure 4 shows the Roots of AR Characteristic Polynomial. Since all roots of a polynomial are in a unit circle, the estimation of the model has a stable framework.

Figure 4. Roots of AR Characteristic Polynomial

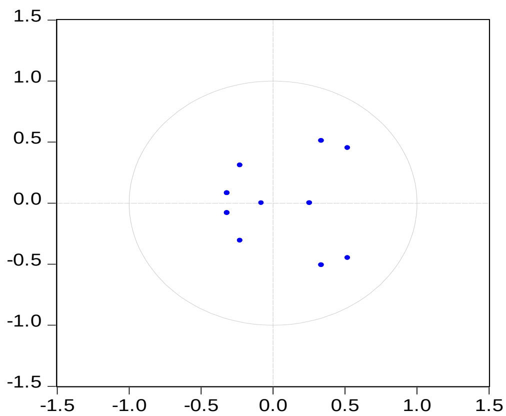


Table 3 shows the results of autocorrelation tests related to estimation which are made with the assigned lag length. According to LM test results, there is no autocorrelation issue in the estimations.

Table 3. VAR Residual Serial Correlation LM Test

Lag	Rao F-stat	Prob.
1	0.7057	0.8506
2	0.4177	0.9944
3	1.0761	0.3697
4	0.4727	0.9862
5	1.3082	0.1530
6	1.1283	0.3097
7	0.5317	0.9695
8	1.0473	0.4054
9	1.0721	0.3746
10	1.4425	0.0832
11	0.9608	0.5206
12	1.5598	0.0466

Table 4 represents the heteroskedasticity test results. According to the results, there is not a heteroskedasticity in the estimations.

Table 4. Heteroskedasticity Tests

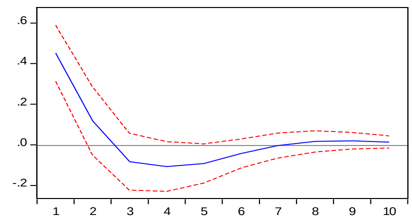
Joint test:		
	Chi-sq	Prob
	1031.633	0.1014

Impulse response functions are examined after the diagnostic tests are made which are related to VAR model. The impact of one standard deviation shock in random error terms on other variables' current and futures values are shown. Thus, dynamic relations among the variables are found. Figure 5 shows how other variables react to the shocks occurred in the upper and lower bounds of the interest rate corridor. Graphs a and b of Figure 5 shows the reaction of overnight repo rate to the one standard deviation shock in the upper and lower bounds of the interest rate corridor. According to the graph a, one standard deviation shock in the lower bound of interest rate corridor result in the same effect in overnight repo rates during two periods. This result is statistically and economically significant. Although one-unit shock in the upper bound of the interest rate corridor affects overnight repo rate in the same direction during 3 periods in graph b, this result is not statistically significant. Graphs c and d show the impact of the BIST100 index on a standard deviation shock in the upper and lower bounds of the interest rate corridor. As it can be seen from graph c, a positive shock in the lower bound of the interest rate corridor affects negatively to BIST 100 index in the first period and the impact of the shock becomes positive in the next periods with converging to equilibrium. In addition, the impact on the BIST 100 index is statistically significant only in the first period. According to graph d, the

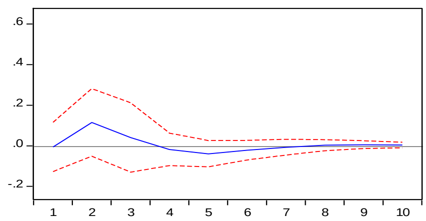
BIST 100 index reacts negatively to a positive shock in the upper bound of the interest rate corridor in the first period. The impact of this shock converges to the equilibrium in the next periods. However, this impact on the BIST 100 index is not statistically significant. The reaction of the dollar/TL exchange rate to the shocks in the upper and lower bounds of the interest rate corridor can be seen in graphs e and f. dollar/ TL exchange rate reacts negatively to the changes in upper and lower bounds of interest rate corridor. However, this result is not statistically significant. Lastly, graphs g and h show how the dollar/ TL exchange rate and BIST 100 index affect each other with the possible shocks. It is found that the BIST 100 index shows a negative and significant reaction to the positive shock in the dollar/ TL exchange rate during two periods. In addition, the dollar/ TL exchange rate shows a significantly negative reaction to a shock in the BIST 100 index during 3 periods.

Figure 5. Impulse-Response Graph

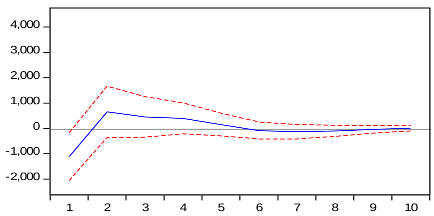
a) Response of overnight repo rate to corridor lower bound



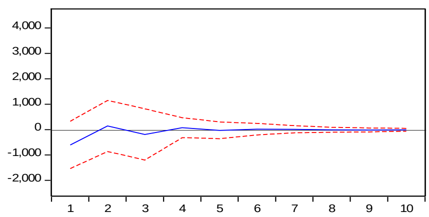
b) Response of overnight repo rate to corridor upper bound



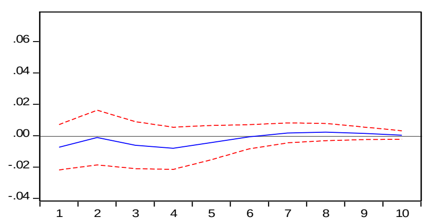
c) Response of Bist 100 to corridor lower bound



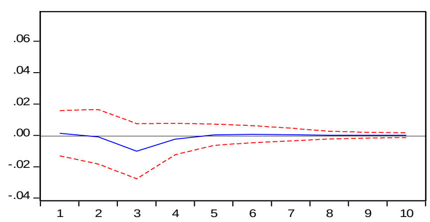
d) Response of Bist100 to corridor upper bound



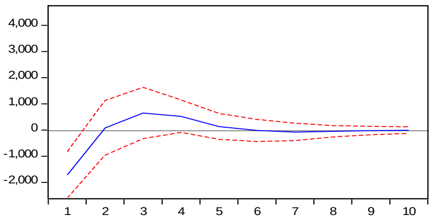
e) Response of dollar to corridor lower bound



f) Response of dollar to corridor upper bound



g) Response of Bist 100 to dollar



h) Response of dollar to Bist100

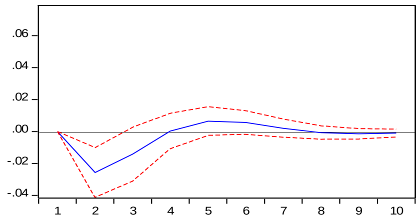


Table 5 represents Variance Decomposition Analysis results. These results show that at what rate a variable's prediction error variance is explained by the shocks in itself and in other variables. The changes in overnight repo rate can be explained by the shocks occurred in itself at 60% rate. The lower bound of the corridor has 35% explanatory power and the explanatory power of exchange rate shocks is about 5% after the 5th period. In addition, changes in the exchange rate can be largely explained by changes in itself. BIST 100 is the second explanatory of the exchange rate with 12% explanatory power. The changes in BIST 100 can be explained by the shocks in itself at 75% ratio. the shocks in the exchange rate affect BIST 100 at 15% ratio and the shocks in the lower bound of interest rate corridor affect BIST 100 at 8% ratio.

Table 5. Variance Decomposition Analysis

Variance Decomposition of overnight repo rate:						
Period	**S.E.**	**corridor lower bound**	**corridor upper bound**	**overnight repo rate**	**dollar**	**bist100**
1	0.742	37.100	0.005	62.894	0.000	0.000
2	0.787	35.208	2.124	59.810	1.210	1.646
3	0.814	33.922	2.231	57.187	4.834	1.823
4	0.827	34.560	2.208	55.528	5.552	2.149
5	0.835	35.145	2.390	54.901	5.451	2.110
6	0.839	35.070	2.436	54.632	5.686	2.174
7	0.841	34.903	2.432	54.442	5.921	2.300
8	0.841	34.892	2.429	54.367	5.960	2.349
9	0.842	34.924	2.432	54.335	5.957	2.349
10	0.842	34.928	2.432	54.313	5.970	2.354
Variance Decomposition of the dollar:						
Period	**S.E.**	**corridor lower bound**	**corridor upper bound**	**overnight repo rate**	**dollar**	**bist100**
1	0.070	1.108	0.034	3.658	95.199	0.000
2	0.081	0.844	0.040	2.717	86.510	9.886
3	0.083	1.335	1.507	2.632	82.293	12.231

4	0.084	2.208	1.547	2.664	81.652	11.924
5	0.085	2.417	1.511	2.724	81.149	12.196
6	0.086	2.405	1.506	2.769	80.787	12.530
7	0.086	2.442	1.507	2.771	80.704	12.573
8	0.086	2.507	1.506	2.772	80.650	12.562
9	0.086	2.533	1.504	2.782	80.600	12.578
10	0.086	2.533	1.504	2.788	80.584	12.588
Variance Decomposition of Bist 100:						
Period	**S.E.**	**corridor lower bound**	**corridor upper bound**	**overnight repo rate**	**dollar**	**bist100**
1	4659.901	5.681	1.690	0.553	13.462	78.612
2	4716.123	7.455	1.741	0.589	13.178	77.034
3	4788.485	8.124	1.850	0.592	14.621	74.810
4	4863.819	8.531	1.814	1.035	15.349	73.268
5	4881.122	8.568	1.806	1.136	15.318	73.170
6	4883.755	8.588	1.805	1.170	15.302	73.132
7	4886.247	8.653	1.804	1.171	15.310	73.060
8	4888.248	8.686	1.802	1.184	15.307	73.018
9	4888.901	8.689	1.803	1.194	15.304	73.008
10	4889.005	8.689	1.803	1.195	15.304	73.006

Conclusions

Over-expander monetary policies applied in developing countries after the 2008 financial crisis-induced an important increase in the amount of global liquidity. As a result developing countries, having lower economic risks and a higher rate of return, attracted a higher amount of foreign capital flow. In addition, important fluctuations were seen in foreign capital movements depending on developments in global risk appetite. This resulted in negativities on the financial system of related economies. Since 2010 TCMB has started to do diversification in monetary policy instruments by taking into consideration these negativities on financial systems. The main aim is to create a policy that considers price stability and financial stability. The interest rate corridor is one of the policy instruments which is applied during this period. TCMB aims to provide price stability and financial stability with the interest rate implication by monitoring the developments related to both the Turkish economy and the global economy. Following this, the main aim of this study is to investigate the impact of the interest rate corridor instrument of TCMB on the financial markets.

Corridor lower bound, corridor upper bound, the overnight repo rate, dollar and BIST100 variables are used in the model of this study. VAR analysis is used to determine the dynamic relationships among the variables. The period between 2010:5-2018:5 is used in the analysis. Because the interest rate corridor instrument is used in this period. Monthly data is used.

According to impulse response analysis, the lower bound of the corridor positively affects the overnight repo rate and the upper bound of the corridor does not have any significant result. While the lower bound of the corridor negatively affects BIST100, the upper bound of the corridor does not have any significant impact. Neither the lower bound of the corridor nor the upper bound of the corridor affect the dollar variable significantly. Dollar and BIST100 variables negatively affect each other. The results of variance decomposition analyses support the results of impulse-response. Hence, the changes in the overnight repo rate are explained by the lower bound of the corridor at the 35% level. The changes in BIST100 explain the changes in the dollar by 12% level. The changes in BIST100 are explained by the changes in the dollar at 15% level and by the changes in the lower bound of the corridor at 8% level.

In conclusion, the lower bound of the corridor has a positive impact on the overnight repo rate and a negative impact on BIST100. However, it does not have any effect on the dollar/TL variable. On the other hand, the upper bound of the corridor does not have any statistically significant impact on any variable in the model. The lower bound of the corridor has a significant impact on the overnight repo rate. This result shows that TCMB has success on the liquidity costs of the markets with the operations it does on the lower bound of interest rate corridor. Furthermore, the absence of the impact of the upper bound of interest rate corridor on the other variables shows that TCMB does these operations by targeting total credits.

References

Alper, K., Kara, H. and Yörükoğlu, M. (2012) Rezerv Opsiyon Mekanizması. TCMB Ekonomi Notları, 28.

Arıkan, C., Görgün, S. and Yalçın, Y. (2018), Parasal aktarım sürecinde faiz koridorunun yeri, *Maliye Dergisi*, 174, pp. 1-25.

Asteriou, D. and Hall, S. G. (2007), *Applied econometrics (2b.),* London: Palgrave Macmillan.

Bagliano, F. C. and Favero, C. A. (1998), Measuring monetary policy with VAR models: An evaluation, *European Economic Review*, 42(6), pp. 1069-1112.

Berentsen, A. and Monnet, C. (2008), *Monetary policy in a channel system*, Federal Reserve Bank of Philadelphia Working Paper, No. 08-7, pp. 1-42.

Binici, M., Erol, H., Kara, H., Özlü, P. and Ünalmış, D. (2013), *Faiz koridoru bir makro ihtiyati araç olabilir mi?*, TCMB Ekonomi Notları, No. 2013/20, pp. 1-16.

Binici, M., Kara, H. and Özlü, P. (2016), *Unconventional interest rate corridor and the monetary transmission: Evidence from Turkey*, CBRT Working Paper, No. 16/08.

Borsa İstanbul (2019), (retrieved from https://www.borsaistanbul.com/en/home-page).

CBRT, 2019. (retrieved from https://www.tcmb.gov.tr/wps/wcm/connect/en/tcmb+en).

Dickey, D. A. and Fuller, W. A. (1990). Distribution of the estimators for autoregressive time series with a unit root, *Econometrica*, 49, 1057-1072.

Gökalp, B. T., (2016), Para politikası kararlarının hisse senetlerinin fiyatları üzerindeki etkileri, *Suleyman Demirel University The Journal of Faculty of Economics and Administrative Sciences*, 21(4), pp. 1379-1396.

Kara, H. (2012), *Küresel kriz sonrası para politikası*, TCMB Çalışma Tebliği, No. 12/17.

Kuzu, S. (2017), Türkiye Cumhuriyet Merkez Bankası (TCMB) faiz koridoru stratejisinin hisse senedi piyasası ve döviz kuru üzerine etkisinin analiz edilmesi, *Uygulamalı Sosyal Bilimler Dergisi*, 1(2), pp. 46-61.

Okatan, T. (2019), Interaction between Istanbul stock exchange and interest rate corridor, Case of Turkey, Master Degree Thesis, Istanbul: Yeditepe University.

Phillips, P. C. and Perron, P. (1990). Testing for a unit root in time series regression, *Biometrika*, 75, 335–346.

Poole, W., Rasche, R. H. and Thornton, D. L. (2002), Market anticipations of monetary policy actions, *Federal Reserve Bank of St. Louis Review*, 84, pp. 65-94.

Sims, A. C. (1980), (1980), Macroeconomics and reality, *Econometrica*, 48(1), pp. 1-48.

CBRT (2012), *2011 Yıllık Rapor*, 23 June (retrieved from https://www.tcmb.gov.tr/wps/wcm).

CBRT (2010), *Para Politikası Çıkış Stratejisi*, 23 June (retrieved from https://www.tcmb.gov.tr/wps/wcm).

Tetik, M. and Ceylan, R. (2015), Faiz koridoru stratejisinin hisse senedi fiyatları ve döviz kuru üzerine etkisinin incelenmesi, *Business and Economics Research Journal*, 6(4), pp. 55-69.

Vural, U. (2013). Geleneksel Olmayan Para Politikalarının Yükselişi, TCMB Uzmanlık Yeterlilik Tezi.

Whitesell, W. (2006), Interest rate corridors and reserves, *Journal of Monetary Economics*, 53, pp. 1177–1195.

Woodford, M. (2000), Monetary policy in a world without money, *International Finance*, 3(2), pp. 229-260.

Yücememiş, B. T. , Alkan, U. and Dağıdır, C. (20159, Yeni bir para politikası aracı olarak faiz koridoru: Türkiye'de para politikası kurulu faiz kararlarının enflasyon üzerindeki etkisi, *Finansal Araştırmalar ve Çalışmalar Dergisi*, 7(13), pp. 449-478.