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Did Commercial Banks Follow The Policy of The Central Bank? Evidence From Selected EU Countries[1]

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ÖZ

Bu çalışma, ticari bankaların belirlediği faiz oranları ile merkez bankası politika faizi arasındaki etkileşimin incelenmesine dayanmaktadır. Bu çerçevede seçilen Avrupa ülkeleri (Bulgaristan, Çekya, Danimarka, Macaristan, Romanya ve Türkiye) için banka faiz oranlarının ülkelere ait merkez bankalarının politika kararlarını takip edip etmediği analiz edilmektedir. Ortaya konulan araştırma hipotezleri, 2010M01-2021M08 dönemleri için Toda-Yamamoto yaklaşımı kullanılarak test edilmiştir. Bulgaristan, Romanya ve Türkiye'de mevduat faizleri ile politika faizleri arasında karşılıklı bir nedensellik olduğunu göstermiştir. Ancak Çekya, Danimarka ve Macaristan için nedensellik yönü sadece politika faizinden mevduat faizine doğrudur. Bankaların politika faizini izlediği hipotezimiz Çek Cumhuriyeti, Danimarka ve Macaristan için geçerlidir. Ancak Bulgaristan, Romanya ve Türkiye'de nedensellik çift yönlü olduğu için bankaların politika faizini izlediği sonucuna varılamamıştır.

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ABSTRACT

This study is based on examining the interaction between the interest rates set by commercial banks and the central bank policy rate. In this framework, it is analyzed whether bank interest rates follow the policy decisions of central banks for selected European countries (Bulgaria, Czechia, Denmark, Hungary, Romania, and Turkey). The research hypotheses put forward were tested using the Toda-Yamamoto approach for the periods 2010M01-2021M08. It showed a reciprocal causality between deposit rates and policy rates in Bulgaria, Romania, and Turkey. However, for Czechia, Denmark, and Hungary, the causality direction was only from the policy rate to the deposit rate. Our hypothesis that banks follow the policy rate is valid for the Czech Republic, Denmark, and Hungary. However, since the causality is bidirectional in Bulgaria, Romania, and Turkey, we couldn't conclude that banks follow the policy rate.

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1. INTRODUCTION

The policy rate, which is used by central banks as a policy tool, affects the interest rates determined by the banks with the operation of the monetary transmission mechanism. Thus, central banks also provide credit controls. In this context, we can say that banks, in a way, follow the policy rate. However, banks may not follow the policies of central banks. In this case, alternative quantitative and qualitative methods (open market operations, direct action, etc.) can be used by central banks.

With the use of short-term interest rates as the main policy tool, the literature has focused on the pass-through level of the policy rate to the bank rate and the pass-through rate. Moreover, it is seen that these vary from country to country. In this study, we consider the causality relationship between the policy rate and bank rates, unlike the literature. Thus, we aim to determine whether banks follow the policy rate according to the direction of causality. For this, we use the Granger causality approach developed by Toda and Yamamoto (1995). Comparing the findings obtained by performing the analyzes in selected sample periods for selected European countries (Czech, Denmark, Hungary, Poland, Romania) and Turkey constitutes our other working rationality. However, the remainder of the study is organized as follows. Section 2 presents the related literature. Section 3 explains the empirical methodology. Section 4 presents the data and empirical results. Section 5 is the conclusion part of our study.

2. RELATED LITERATURE

The reflection of the policies implemented by the central banks on the money market is realized through the interest rates and the costs incurred after this change are transferred to the interest rates by the commercial banks. Studies on the relationship between central bank rates and commercial bank rates within the scope of monetary transmission mechanism, interest rate pass-through are frequently encountered in the literature. The findings of those who are close to our study are summarized as follows.

Cottarelli and Kourelis (1994), while modeling the short-term dynamics of the degree of stickiness in the loan rate, used market rates and policy rates together and discussed the structural reasons for the differentiation between countries in the transmission mechanism. In the study conducted for 31 developed and developing countries, it was found that due to the sticky loan rates, the loan rates of commercial banks could not adapt to the changes in the policy rates as much as the money market rates. As for the structural reasons for the differentiation between countries, they cited factors that reduce competition (entry barriers), the existence of public banks, the absence of restrictions on capital movements, the development of markets and the volatility in interest rates.

Borio and Fritz (1995), using the 1984:M1-1994:M7 period data of 12 industrialized countries, made two different model estimations to measure the reaction of loan rates to policy rates. In the first model, the response of loan rates was measured by giving a shock of 100 basis points to many variables affecting loan rates; In the other model, the response of the money market interest rate was tried to be measured by shocking only the policy rate. According to the findings, it has been observed that while loan rates react to policy rate changes in a period of one month to one year, money market interest rates generally give strong responses to policy rates.

Mojon (2000) his study, analyzed the difference in the interest channel functioning of the monetary transmission mechanism in the economies of the 6 largest countries in the Eurozone (Belgium, France, Germany, Italy, Netherlands and Spain) with different financial structures. In the study, firstly, how policy rates are reflected on retail bank interest rates was compared for the period before and after the monetary union, and how these two interest rates changed during the interest rate cycle. By using the error correction model, the reaction of the changes in the policy rates on the quarterly 25 loan rates and 17 deposit rates was calculated. As a result of the panel analysis, it was determined that the international asymmetry in the response of banks' interest rates to monetary policy interest rates decreased with the transition to single monetary policy implementation and the integration of money markets. In addition, it has been argued that the difference in financial structure is a significant determinant in the reflection of the monetary policy rate on the bank rates.

De Bondt (2002) examined the pass-through effect of market interest rates applied by central banks in the Eurozone to loan and deposit rates by using the vector error correction model for the 1996:M1-2001:M5 period data. According to the results of the analysis, it has been found that the instant pass-through rate of money market interest rates to retail loan and deposit rates is incomplete and the portion of a change that is reflected within a month is typically around 30%, while the highest immediate pass-through is at most 54% over a one-year term. However, it was concluded that money market interest rates are typically full (average rate 3 to 10 months) and above 100%, with banks' loan and deposit interest rate pass-through. This is explained by asymmetric information costs without credit rationing.

İnal (2006), in his study for the daily data of the 2001:M7-2006:M3 period, investigated the effect of the changes in the interest rate by the CBRT on the relative long-term interest rates by using the case study approach. By using market-based measurements, the expected and surprising parts of the 37 interest rate changes made in the said period are separated. According to the findings, it has been seen that the forecasts are compatible with the expectations

hypothesis and the coefficients showing the policy surprises are large and statistically significant, while the coefficients showing the expected part of the monetary policy are small and not statistically significant. The findings have been interpreted as reducing the uncertainty of the policies implemented after the 2001 crisis, and the effectiveness of the CBRT's interest rate decisions within the transmission mechanism gradually increased and a significant relationship began to emerge between interest rates.

Karagiannis, Panagopoulos, and Vlamis (2010) analyzed the importance of central bank policy rates and interbank money market interest rates in affecting banks' loan and deposit rates for the Eurozone and the USA, using the disaggregated GETS methodology. In the aforementioned study, it has been determined as a result of the analyzes that short-term money market interest rates are relatively more effective on loan and deposit interest rates compared to the policy rate in the Euro Zone, while the policy rate is more determinant in the USA. However, it was emphasized that the interest transmission mechanism deteriorated both in the Euro Zone and in the USA during the financial crisis, while the interest rate pass-through changed significantly before and after the financial crisis.

Binici, Erol, Kara, Özlü and Ünalmış (2013), using VAR analysis for two sub-periods 2005:M1-2010:M5 and 2010:M11-2012:M12, examined how the monetary policy affects the transfer of loan and deposit rates in the application of the asymmetric interest rate corridor. . In the first sub-period, it has been determined that the loan and deposit rates have strong and significant responses to the overnight borrowing interest rate, which is the policy rate, and therefore, the said rates are not affected by changing the policy rate. However, in the second sub-period, the response of loan rates to the weekly repo auction rate, which is the policy rate, is statistically insignificant; On the other hand, it was observed that deposit rates reacted significantly to the policy rate, but weakly compared to the previous period. This result is attributed to the increase in vehicle diversity.

Aristei and Gallo (2014) analyzed the interest rate pass-through for the interbank and retail interest rates in the Eurozone during the financial crisis periods for the 2003:M1-2011:M9 period using the Markov Switching VAR model. They found that the short-term transmission mechanism between interbank and retail interest rates weakened significantly during the financial crisis, and the sensitivity to deviations in the long-term transmission mechanism increased. In addition, they stated that the transmission mechanism is higher in bank loans than in retail loans in normal periods and financial crisis periods when volatility is high.

Şıklar, Doğan and Dinç (2016), with the help of monthly data for the period of 2003-2013, aimed to investigate the changes in monetary policy rates by using the ARDL method, the transmission mechanism of the banks' loan and deposit interests, GDP and prices. According to the findings of the study, in case of changes in policy rates, the transfer rate to deposit rates is higher in Turkey; They concluded that the transfer was later reflected in consumer loan rates and GDP. To summarize, the partial pass-through effect of the change in policy rates towards loan and deposit rates is weak, while the pass-through effect on GDP and prices is weak.

Holton and Rodriguez d'Acri (2018) investigated the heterogeneity in the interest rate transition process for 12 Eurozone countries with the help of ARDL and error correction model, based on the 2007-2012 period data. The interest rate is estimated using variables that take into account transitional heterogeneity, macroeconomic volatility and market structure, and capture the funding structure, risk and assets of banks as well as standard bank characteristics such as size, capital and liquidity. The results showed that these variables affect the heterogeneity in the transition period in terms of both magnitude and speed. In addition, they stated that the changes made by the central banks in the money market did not fully reflect on the bank interest rates, the low quality of assets in the bank characteristics caused a significant decrease in the transition, the bank size and funding structure were more important in small loans and capital in large loans.

In his study, Güler (2021) investigated which of the official funding rates (CBRT overnight lending and weekly repo rates) and actual interest rates (CBRT average funding and BIST overnight market rate) reflecting the CBRT's policy stance are determinative in the transfer of banks to loan and deposit rates using the GMM method. . As a result of the analyzes made using the 2013:M1-2018:M11 period data in the study, it has been found that the actual interest rather than the official interest plays a more decisive role in the loan and deposit interests of the banks. However, it has been stated that the BIST overnight market rate is more decisive in both consumer loan and commercial loan pricing, while the CBRT average funding rate stands out in deposit rate pricing. According to these results, it is emphasized that the policy rates are partially reflected on the loan and deposit rates of the banks, and the reflection is mostly realized through the actual interest rates.

Varga (2021) suggested that the link in the interest rate pass-through weakened after the global financial crisis and that the banks' prime rate or interbank interest rate, called the Weighted Average Cost of Liability (WACL), might be a better proxy. For this purpose, the WACL cointegration and ARDL model were applied to the monthly data starting in 2003, 2004, and 2007 and ending in 2017 for Hungary, the Czech Republic, and Romania from the Eurozone, respectively. As a result of the analysis, it has been found that WACL should be used instead of the interbank interest rate and it is more stable. He also stated that the deterioration of long-term relationships can be explained by changes in the

components of retail interest rate margins and that banks should also consider market structure, competitiveness, risk perception, and risk aversion while determining interest rates.

3. ECONOMETRIC METHODOLOGY

Before proceeding with the method, it is necessary to make some limiting assumptions for the tests of our hypotheses. First, we assume that only the central bank uses the policy rate ***(pr_t)*** as a policy instrument. In addition, we assume that deposit rates ***(dr_t)*** represent bank rates. Thus, if the direction of the causal relationship is from the policy rate to the bank rates, we can make a judgment that banks follow the policy rate. If the causality is bidirectional and runs from the bank rate to the policy rate, then we will make a contrary judgment. When the causality tests used in the related literature are examined, it is seen that the standard Granger (1969) causality test has the possibility of giving false regression results, and the Granger causality tests based on the Error Correction Model (ECM) have the possibility of false inference (Toda & Phillips, 1993). The Toda and Yamamoto (1995) test, on the other hand, does not require knowledge of cointegration properties. In addition, it can be applied even when the series is not stationary and does not fulfill the rank conditions, as long as the degree of cointegration does not exceed the actual lag length of the model (Tetik and Kara, 2020). Thus, in our study, Toda and Yamamoto (1995) causality test was used to evaluate whether the deposit rate ***(dr_t)*** followed the policy rate ***(pr_t)*** for all selected countries.

The Toda and Yamamoto approach can be accomplished in two steps. In the first step, the optimum lag length ***(k)*** and the maximum degree of cointegration ***(d_{max})*** are determined. Information criteria such as AIC, SIC and Hannan-Quinn are used to determine the latency nature of the VAR system. After determining the structure and degree of cointegration of the VAR model, a VAR model with a total ***$p = (k + d_{max})$*** delay is estimated.

The Toda and Yamamoto approach use a modified Wald (MWald) test to test the constraints on the parameters of the VAR (k) model (Tapşın and Karabulut, 2013). The MWald test has an asymptotic 2 distribution with k degrees of freedom. The effectiveness of MWald tests for the Granger causality test increases when using Seemingly Unrelated Regression (SUR) models (Rambaldi and Doran, 1996). With a similar approach, a bivariate VAR model is estimated as follows, using the SUR method, respectively, to perform the Toda and Yamamoto Granger causality test in this study.

$$pr_t = \alpha_0 + \sum_{i=1}^{k+d_{\max}} \alpha_{1i}\, pr_{t-i} + \sum_{j=1}^{k+d_{\max}} \alpha_{2j}\, dr_{t-j} + u_t \quad (1)$$

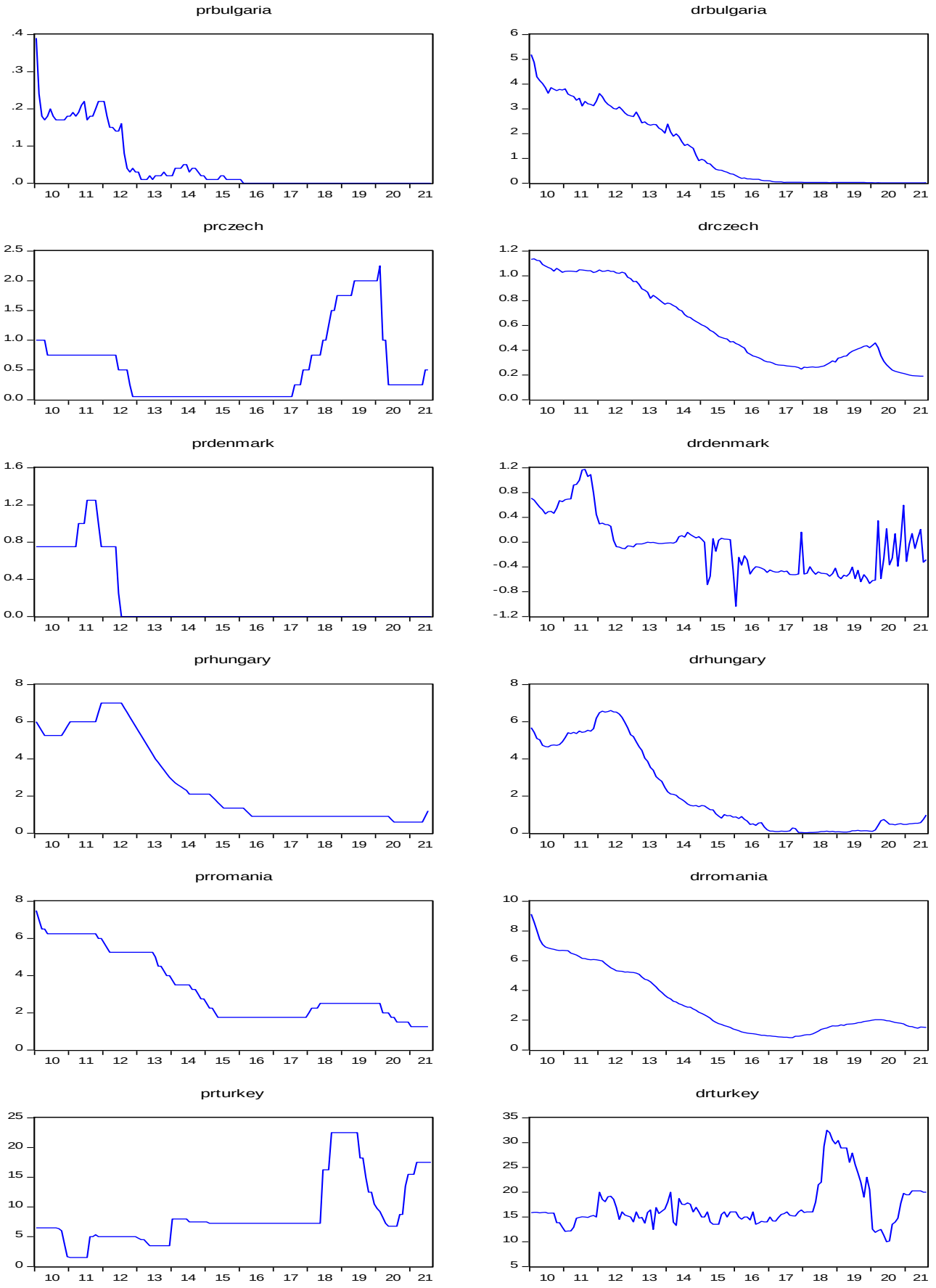
$$dr_t = \beta_0 + \sum_{i=1}^{k+d_{\max}} \beta_{1i}\, dr_{t-i} + \sum_{j=1}^{k+d_{\max}} \beta_{2j}\, pr_{t-j} + u_t \quad (2)$$

In equation 1, if ***α_{2j}*** is statistically significant, deposit rates are not the granger cause of policy rate and the null hypothesis is rejected. Similarly, in equation 2, if ***β_{2j}*** is statistically significant, the null hypothesis that the policy rate is not the granger cause of the deposit rate is rejected. Thus, by testing these hypotheses, we will determine whether the deposit rate ***(dr_t)*** follows the policy rate ***(pr_t)***.

4. DATA and RESULTS

In the study, we tested monthly frequency data from January-2010/August-2021 to analyze whether the deposit rate ***(dr_t)*** follows the policy rate ***(pr_t)*** in selected European countries (Bulgaria, Czechia, Denmark, Hungary, Romania and Turkey). The reason for the sampling start date to be January-2010 is the concern that the 2008 financial crisis will cause instability in parameter estimates. In addition, a common sample period was determined for all countries and analyzes were made accordingly. Monetary Policy-Related Interest Rate is used for the central bank policy rate, while Other Depository Corporations Rates/Deposit Rates are used for deposit interest data. Both series were obtained from the IMF database. The representation of the variables is as in Figure 1.

Figure 1: Selected EU Countries and Turkey's Policy and Deposit Rates



Source: IMF Database

Figure 1 gives a clue that policy rates and deposit rates move together. However, it is not possible to analyze the causal relationship structure from this figure. Before proceeding with the analysis, we will look at some properties of the series. First of all, various descriptive statistics on policy and deposit interest rates are presented in Table 1.

Table 1. Descriptive Statistics

	Bulgaria		***Czechia***		***Denmark***		***Hungary***		***Romania***		***Turkey***	
	pr_t	dr_t	pr_t	dr_t	pr_t	dr_t	pr_t	dr_t	pr_t	dr_t	pr_t	dr_t
Average	0.05	1.34	0.55	0.6	0.18	-0.06	2.7	2.16	3.37	3.15	8.55	17.03
Maximum	0.39	5.19	2.25	1.14	1.25	1.17	7.00	6.59	7.5	9.13	22.5	32.5
Miximum	0.00	0.01	0.05	0.19	0.00	-1.04	0.6	0.03	1.25	0.83	1.50	10.00
Std. Deviation	0.08	1.51	0.61	0.32	0.36	0.46	2.26	2.29	1.82	2.19	5.38	4.51
Skewness	1.59	0.66	1.23	0.33	1.65	0.69	0.74	0.72	0.61	0.78	1.41	1.72
Kurtosis	4.70	1.91	3.52	1.5	4.2	2.86	1.88	1.87	1.81	2.24	4.15	5.71
J.B test	75.06	16.77	36.4	15.55	71.5	11.11	20.12	19.52	16.93	17.34	53.64	111.14
Number of Observations	139	139	139	139	139	139	139	139	139	139	139	139

According to Table 1, policy and deposit rates in Turkey are more volatile than in other countries. Turkey is followed by Hungary and Romania, respectively. There are skewness and excessive kurtosis in all series. Therefore, the Jarque-Bera (JB) test statistics show that not all series are normally distributed. In order to examine the stochastic properties of policy and deposit rate series, standard unit root tests were performed. See Table 2 for ADF (Dickey and Fuller, 1981), PP (Phillips-Perron, 1988) and KPSS (Kwiatkowski, Phillips, Schmidt, & Shin, 1992) test results.

Table 2: Unit Root Tests

		ADF Test		**PP Test**		**KPSS Test**	
		Constant	*Constant and Trend*	*Constant*	*Constant and Trend*	*Constant*	*Constant and Trend*
Bulgaria	pr_t	-1.974	-2.962	-6.256***	-6.967***	1.078***	0.301***
	dr_t	-5.013***	-3.021	-4.252***	-2.991	1.372***	0.352***
Czechia	pr_t	-1.927	-2.076	-1.834	-1.940	0.281***	0.184*
	dr_t	-0.662	-1.424	-0.835	-1.212	1.378***	0.250***
Denmark	pr_t	-2.232	-2.465	-2.245	-1.962	0.824***	0.242***
	dr_t	-2.044	-3.021	-3.116	-4.764***	0.984***	0.234***
Hungary	pr_t	-1.350	-1.002	-1.407	-0.907	1.352***	0.240***
	dr_t	-1.803	-0.655	-1.504	-0.720	1.120***	0.249***
Romania	pr_t	-2.802	-2.014	-2.560	-2.047	1.241***	0.304***
	dr_t	-1.365	-4.303***	-4.252***	-2.210	1.242***	0.362***
Turkey	pr_t	-2.506	-3.976**	-1.772	-2.877	0.896***	0.069
	dr_t	-2.319	-2.555	-2.655*	-2.921	0.332*	0.061

Note: The lag length for the ADF test was chosen based on the Schwarz information criterion. PP and KPSS tests are estimated based on Bartlett-core using Newey-West bandwidth. The null hypothesis of the ADF and PP tests is that the series is not stationary, and the null hypothesis of the KPSS test is that the series is stationary. ***, ** and * indicate statistical significance at 1%, 5% and 10% levels, respectively.

The results in Table 2 do not give clear information about whether policy and deposit rates are stable for all countries. In the literature, the degree of cointegration of interest rates is controversial. While Nelson and Plosser (1982) defined the interest rate as a non-stationary variable, Martin and Milas (2013) claimed that the degree of cointegration of interest rates is uncertain and decided to treat it as stationary. As stated in the previous section, the Toda and Yamamoto (1995) test can also be applied when the series is not stationary. In this framework, the Toda-Yamomoto test results, which empirically test the interaction between FED and CBRT policy decisions, are given in Table 3.

Table 3: Toda and Yamamoto Test Results

	Null Hypothesis	k	k+d_{max}	MWald İst.	p-değeri	Direction of Causality
Bulgaria	dr_t *does not Granger cause* pr_t.	10	10+1=11	32.12	0.000***	$dr_t \rightarrow pr_t$
	pr_t *does not Granger cause* dr_t	10	10+1=11	70.21	0.000***	$pr_t \rightarrow dr_t$
Czechia	dr_t *does not Granger cause* pr_t.	3	3+1=4	4.62	0.328	No Causality
	pr_t *does not Granger cause* dr_t	3	3+1=4	43.63	0.000***	$pr_t \rightarrow dr_t$
Denmark	dr_t *does not Granger cause* pr_t.	3	3+1=4	1.90	0.753	No Causality
	pr_t *does not Granger cause* dr_t	3	3+1=4	1043	0.03**	$pr_t \rightarrow dr_t$
Hungary	dr_t *does not Granger cause* pr_t.	2	2+1=3	2.37	0.497	No Causality
	pr_t *does not Granger cause* dr_t	2	2+1=3	131.30	0.000***	$pr_t \rightarrow dr_t$
Romania	dr_t *does not Granger cause* pr_t.	2	2+1=3	7.37*	0.051*	$dr_t \rightarrow pr_t$
	pr_t *does not Granger cause* dr_t	2	2+1=3	24.52	0.000***	$pr_t \rightarrow dr_t$
Turkey	dr_t *does not Granger cause* pr_t.	4	4+1=5	13.27	0.021**	$dr_t \rightarrow pr_t$
	pr_t *does not Granger cause* dr_t	4	4+1=5	20.22	0.000***	$pr_t \rightarrow dr_t$

Note: The optimal lag length (k) for the bivariate VAR model is expressed by the degree of cointegration (dmax). The choice of lag length was decided according to Schwartz Information Criteria. The optimal lag length for Bulgaria is 10, for Czechia 3, the autocorrelation test is sufficient for us to test the assumptions of the model. The VAR resisdual serial corelation LM test scores performed are 1.02 for Bulgaria(10), 4.43 for Czechia, 5.33 for Denmark, 6.40 for Hungary, 10.32 for Romania, and 2.72 for Turkey. At the 1% level, the residual terms are not autocorrelated in all models except Romania. *** * indicates 1%, ** 5%, and * 10% significance level.

When the test statistics in Table 3 are evaluated, based on the estimation results of Equation 1 according to the Toda-Yamamoto approach, the basic hypothesis that deposit rates are not the cause of policy interest rates cannot be rejected for Bulgaria, Romania and Turkey. However, it is rejected for Czechia, Denmark and Hungary. According to the estimation of Equation 2, the basic hypothesis that deposit rates are not the cause of policy rates is rejected for all countries. That is, the policy rate is a cause of the deposit rate in all countries. This may be related to the interest rate pass-through and partial interest rate pass-through mentioned in Güler (2021), Holton and Rodriguez d'Acri (2018), Şıklar, Doğan and Dinç (2016), and De Bondt (2002). Thus, for the 2010-August 2020, a reciprocal causality was determined between deposit rates and policy rates in Bulgaria, Romania and Turkey. Besides, for Czechia, Denmark and Hungary, the causality direction is from policy rate to deposit rate. If the direction of the causal relationship is from the policy rate to the bank rates, our hypothesis that banks follow the policy rate is valid for Czechia, Denmark and Hungary. However, since the causality is bidirectional in Bulgaria, Romania and Turkey, we cannot conclude that banks follow the policy rate. We think that this differentiation at the level of countries may be due to the difference in financial structure mentioned in Mojon (2020). In addition, the differentiation of the policy consistency of central banks at the level of countries may have led to this result.

5. CONCLUSION

Central banks affect financial markets by changing market interest rates with changes in policy interest rates, and then they start to affect banks' deposit and loan interest rates decisions. Therefore, the power of monetary policy practices to affect the market and bank interest rates is closely related to the policy consistency of central banks and the efficiency of the transmission mechanism.

It is expected that the policy consistency of the central banks and the efficiency of the transmission mechanism, and the changes in the policy interest rates will be reflected in the interest rates of the banks. However, macroeconomic conditions, inconsistent monetary policy practices, and the structure of the financial system of countries can affect this negatively.

In this study, we discussed the causality relationship between the policy rate and bank rates. We determined whether banks follow the policy rate according to the direction of causality for selected European countries (Czech, Denmark, Hungary, Poland, Romania) and Turkey. The findings showed a reciprocal causality between deposit rates and policy rates in Bulgaria, Romania, and Turkey. However, for Czechia, Denmark, and Hungary, the causality direction was only from the

policy rate to the deposit rate. As a result, we tested our hypothesis according to the direction of the causal relationship. We conclude that our hypothesis that banks follow the policy rate is valid for the Czech Republic, Denmark, and Hungary. However, since the causality is bidirectional in Bulgaria, Romania, and Turkey, we couldn't conclude that banks follow the policy rate. As a result, according to these findings we obtained; We can comment that policy consistency and transmission mechanism efficiency of Central banks in Czechia, Denmark and Hungary are higher than Bulgaria, Romania, and Turkey.

6. FURTHER STUDIES

In further studies, taking into account the existence of structural breaks in the series, if there are structural breaks, these breaks can be included in the models.

The commercial bank's follow-up strategy depends on the policy consistency of the central bank. In this framework, since the consistency of central banks may change over time, causality between banks and central banks can be tested based on a time-varying structure.

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