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Transmission Mechanisms of Conventional and Unconventional Monetary Policy: Evidence from the Türkiye Banking Sector

Geleneksel ve Geleneksel Olmayan Para Politikasının Aktarım Mekanizmaları: Türkiye Bankacılık Sektöründen Kanıtlar

Erhan AKARDENİZ
Gaziantep Üniversitesi Sosyal Bilimler Meslek Yüksekokulu
erhanakardeniz@hotmail.com, ORCID: https://orcid.org/0000-0003-2269-8182

Özet

Para politikası, bankacılık sektörü ve finansal istikrar üzerinde doğrudan etkisi olan temel makroekonomik araçlardan biridir. Bankaların kârlılığı, hem banka-spesifik faktörler hem de makroekonomik koşullar tarafından belirlenmektedir. Geleneksel para politikası araçları (faiz oranları, zorunlu karşılık oranları gibi) uzun süredir bankacılık performansını şekillendiren temel unsurlar olarak kabul edilirken, 2008 küresel finansal krizinden sonra merkez bankalarının uyguladığı geleneksel olmayan araçlar (likidite enjeksiyonları, varlık alımları, ters repo vb.) bankaların marj ve kârlılıklarını etkilemede giderek daha kritik bir rol oynamaya başlamıştır. Türkiye için 2011-2025 dönemine ait aylık veriler ile değerlendirme yapılmıştır. ARDL uzun dönem katsayıları ve kısa dönem ECM ile analiz yapılmıştır. Son olarak Toda-Yamamoto nedensellik ilişkisi ile değişkenler arası ilişkiler ele alınmıştır. Araştırmada, rezerv opsiyon mekanizması ve likidite işlemlerinin (geleneksel olmayan araçlar) aktif kârlılığı olumsuz etkilediğini; buna karşılık rezerv zorunlu karşılıklar ve fonlama maliyetinin (geleneksel araçlar) olumlu etkilediği görülmektedir.

Anahtar Kelimeler: Monetary Policy, Macroeconomics, Banks.

Abstract

Monetary policy is one of the fundamental macroeconomic tools that has a direct impact on the banking sector and financial stability. Both macroeconomic conditions and bank-specific factors affect a bank's profitability. While traditional monetary policy tools (such as interest rates and reserve requirements) have long been considered fundamental elements shaping banking performance, unconventional tools implemented by central banks after the 2008 global financial crisis (such as liquidity injections, asset purchases, and reverse repos) have begun to play an increasingly critical role in affecting banks' margins and profitability. An assessment was made for Türkiye using monthly data from the period 2011-2025. The analysis was conducted using ARDL long-run coefficients and the short-run ECM. Finally, the Toda-Yamamoto causality relationship and the relationships between variables were discussed. The reveals that the reserve option mechanism and liquidity operations (non-traditional instruments) have a negative impact asset profitability, while reserve requirements and funding costs (traditional instruments) have a positive effect.

Keywords: Para Politikası, Makroekonomi, Bankalar.

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INTRODUCTION

In recent years, the Türkiye economy has experienced significant changes in its monetary policy practices due to both the impact of global financial crises and domestic economic fluctuations. The Central Bank of the Republic of Türkiye (CBRT) has attempted to ensure the stability of the banking system by using unconventional tools in addition to conventional ones, such as swap transactions, liquidity injection, and the reserve option mechanism. As one of the most important components of the Türkiye financial system, the banking sector is high sensitive to changes in monetary policy. In this context, indicators such as banking sector profitability, deposit and loan volume are critically important in evaluating the effectiveness of monetary policy (Aysan, Fendoğlu & Kılınç, 2014; Sezerer, Kahraman & Afşar, 2024). Traditional monetary policy tools, particularly interest rates and reserve requirements, have a direct impact on banks' credit supply and profit margins (Kara, 2012; Çapacıoğlu & Alper, 2023). In addition, unconventional tools are implemented, especially during periods of economic crisis and liquidity squeeze, to reduce banks' short-term funding costs and improve their liquidity positions (Aysan, Fendoğlu & Kılınç, 2014; Sezerer, Kahraman & Afşar, 2024). Additionally, macroeconomic variables such as inflation, exchange rates, and economic growth directly impact the risk and profitability profile of banks. Specifically for Türkiye, the effects of monetary policy on the banking sector become more pronounced during exchange rate shocks and periods of high inflation (Gürkaynak, 2023; Kartal, 2024). In this context, the main hypotheses to be tested in the study are as follows: (1) Whether traditional monetary policy tools have a significant impact on the profitability of the banking sector; (2) The effect of unconventional monetary policy tools on banks' deposit and loan volumes; (3) The nature of the relationship between macroeconomic variables (inflation, growth, exchange rate) and bank profitability.

The contributions of this study to the field are as follows: (i) The research will report findings about the comparative effectiveness of conventional versus unconventional monetary policies adopted by the Central Bank of the Republic of Türkiye. (ii) Evidence from Türkiye will be presented using the ARDL and Toda-Yamamoto methods.

The paper is organized into four sections. In the first section, the changes in the monetary policies of the Central Bank of the Republic of Türkiye are presented; in the second section, the functioning of the transmission mechanism between the variables is revealed. In the third chapter, evaluations are made regarding the findings reached through the research conducted. Then the models were set up. In the fourth chapter, the empirical results obtained are evaluated. In the final section, various policy recommendations were developed based on the findings obtained.

THEORETICAL FRAMEWORK

Monetary policy is a set of tools implemented by central banks to ensure price stability in an economy and support sustainable economic growth. In traditional literature, monetary policy directly impacts the banking sector and financial markets through interest rate and credit channels (Bernanke & Blinder, 1992; Mishkin, 1996). In developing countries, the financial system's bank-heavy nature makes the impact of monetary policy more pronounced through the banking channel.

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Traditional monetary policy tools directly affect banks' interest margins, credit volume, and liquidity (Mishkin, 1996). Interest rates and the weighted average cost of funding determine banks' lending costs and affect asset profitability (ROA); interest rate increases raise the cost of credit, putting pressure on banks' profit margins. Reserve requirements regulate credit supply and liquidity management through the obligation of banks to hold a certain portion of their deposits at the central bank, and can affect lending capacity in the short term. The reserve option mechanism, on the other hand, provides flexibility in banks' liquidity management by allowing them to hold required reserves in TL or foreign currency, and creates indirect effects on credit volume. In developing countries, the effects on bank profitability and return on assets through these instruments occur particularly via the credit and interest rate channels (Dietrich & Wanzenried, 2011; Bikker & Vervliet, 2022). Following the 2008 global financial crisis, central banks developed unconventional tools. Among these tools in Türkiye, liquidity management, swap transactions, repo applications, and the flexible use of the reserve option mechanism stand out. Liquidity operations the flow of credit by providing short-term funding to the banking system. Repo and swap transactions reduce banks' short-term funding costs, increase foreign currency and Türkiye lira liquidity, and strengthen financial stability. Research shows that these instruments significantly impact banks' short-term funding costs and asset profitability (Aysan et al., 2014; Sezerer et al., 2024). Mishkin (2007) highlights the role of unconventional tools, particularly on the liquidity channel and financial stability.

The impact of monetary policy is also reflected in the banking sector through macroeconomic variables. During periods of high inflation, the credit risk premium increases and the profitability of banks' assets can be suppressed. Exchange rate fluctuations affect the balance sheets of banks, especially those with foreign currency debt. Increased economic activity raises credit demand, thereby boosting the profitability potential of banks. Specifically for Türkiye, the impact of monetary policy changes on banking becomes more pronounced during exchange rate shocks and periods of high inflation (Gürkaynak, 2023). The profitability of banks' assets is generally lower compared to the profitability of companies operating in the industrial and service sectors. The main reasons for this are that banking activities have high leverage ratios, are subject to strict regulatory constraints, and are sensitive to fluctuations in macroeconomic and market conditions. Another element affecting asset profitability is bank size; small banks may, for a while, have greater asset profitability values than large banks, but this could alter if market conditions deteriorate (Dietrich & Wanzenried, 2011; Bikker & Vervliet, 2022).

$$Return\ on\ Assets(ROA) = \frac{Net\ Income}{Total\ Assets} \quad (3)$$

In this context, the effects of conventional and unconventional monetary policy tools on bank profitability in the Türkiye banking sector can be explained through three main channels: in the interest rate channel, interest rates and the weighted average funding cost change credit costs and profit margins (Mishkin, 2007); in the credit channel, the reserve option mechanism and required reserves affect banks' credit volume and liquidity; and in the liquidity and asset price channels, liquidity, repo, and swap transactions change short-term funding costs and banks' return on assets. This approach provides the theoretical underpinnings for the variables to be used in the empirical

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analysis of the study and presents a holistic model of monetary policy effects, taking into account the unique characteristics of the Türkiye banking system. Traditional view: Monetary policy directly affects the banking sector through the interest rate channel and the credit channel (Bernanke & Blinder, 1992). In developing countries, due to the bank-dominated financial system, the effects of monetary policy are stronger through the banking channel. Among traditional monetary policy tools, interest rates affect credit costs and banks' interest margins. Required reserves, on the other hand, determine the liquidity and credit supply of banks. Unconventional tools (such as liquidity management, swap transactions, and reserve option mechanisms) were developed to support the banking system during crisis periods. Aysan et al. (2014) and Sezerer et al. (2024) emphasized that these instruments have a significant impact on the short-term funding costs of banks. Inflation, exchange rates, and growth dynamics affect banks' credit risk and profitability. Specifically for Türkiye, the effects of monetary policy on the banking sector become more pronounced during exchange rate shocks and periods of high inflation (Gürkaynak, 2023).

LITERATURE SUMMARY

In the literature, the profitability of the banking sector is affected by both bank-specific and macroeconomic factors. Global and Türkiye examples show that changes in monetary policy, particularly interest rates and liquidity instruments, directly or indirectly affect banks' profitability indicators such as ROA and ROE. Additionally, economic shocks such as crisis periods (1994, 2001, 2008) and the pandemic (2020) have significantly impacted the performance of the banking sector.

In a panel regression study covering 80 countries, Demirgüç-Kunt & Huizinga (1999) examined the effects of bank-specific and macroeconomic variables on banking profitability. Analyses have shown that inflation increases net interest margins, particularly in developing countries, and affects bank profitability. The study used data from the 1988–1995 period. Saunders & Schumacher (2000) examined the relationship between net interest margins (NIM) and profitability through regression analyzes conducted on European and US banks. The results showed that market structure and risk premiums play a decisive role in banks' profitability. Banking data from the 1990-1998 period was used in the study. Athanasoglou, Brissimis & Delis (2008), in their GMM panel analysis of Greek banks, found that bank-specific factors are significant for profitability; while the impact of macro variables is limited, it increases during crisis periods. The study covers data from the 1995-2002 period. Borio, Gambacorta & Hofmann (2017) emphasized that low interest rate policies put pressure on banks' net interest margins and profitability, and that a strong capital structure serves as a buffer against shocks. The study examined the period from 2000 to 2015 in developed countries. Claessens, Coleman & Donnelly (2018) showed that during periods of low interest rates, banks were forced to diversify their income and margin compression was significant. The analysis was conducted using data from European and US banks from the period 2008–2017. Gambacorta & Shin (2018) emphasized that the capital structure of banks is critical for the effectiveness of monetary policy, and that strong capital stabilizes credit and profitability mechanisms. The study covers data from the period 2000–2016. Kosmidou (2008) found that bank-specific and macro variables influenced profitability in the case of Greek banks. The study analyzed panel data from the 1990–2005 period. Keskin (2019) emphasized that in developing countries, including Türkiye,

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macroprudential regulations and monetary policy determine credit supply and affect banking performance. The study used data from the 2000-2017 period. Kawamura (2021) stated that the liquidity management of the Central Bank of Türkiye and unconventional instruments are becoming increasingly important for banking profitability in developing countries. The analysis is based on data from the 2010–2020 period. Ali (2022) examined the relationship between monetary policy and financial markets using the Fourier-ARDL method, demonstrating the effective detection of structural breaks. The study has use a dataset from the period 1995–2021.

Uluyol (2019) analyzed the Türkiye banking sector between 1980 and 2000 historically and descriptively, emphasizing that liberalization and privatizations grew the sector, but resilience was limited during crisis periods. Karacan (2010), through a macroeconomic regression analysis of the 2000–2009 period, found that interest rate and exchange rate fluctuations affect banking performance. Yıldırım & Mirza (2020) examined the heterogeneous effects of ROK implementation on banks' funding structure and profitability in the post-2010 period using panel regression. Türkmen, Üçay & Uzan (2021) examined the period 1990–2020 using panel regression and descriptive analysis, and found that banking profitability was negatively affected during crisis and pandemic periods, and that a strong capital structure limited losses. Chronological and thematic combination: The banking sector in Türkiye has historically shown post-liberalization growth; interest and exchange rate fluctuations after 2000 have affected profitability, and unconventional monetary policies (ROK, liquidity instruments) after 2010 have created heterogeneous and short-term effects on profitability. Pandemic and crisis periods have tested the resilience mechanisms of banks.

International and Türkiye-focused studies on banking profitability show that both bank-specific factors and macroeconomic variables are determinants of performance in the sector. In the international literature, early studies such as Demirgüç-Kunt & Huizinga (1999) have shown that inflation and macroeconomic conditions increase net interest margins, especially in developing countries. Similarly, studies such as Saunders & Schumacher (2000) and Athanasoglou, Brissimis & Delis (2008) have emphasized the effects of bank-specific risk, market structure, and capital structure on profitability, stating that the importance of macro variables increases during crisis periods.

In the context of developed countries, Borio, Gambacorta & Hofmann (2017), Claessens, Coleman & Donnelly (2018), and Gambacorta & Shin (2018) emphasized that the low interest rate environment put pressure on banks' net interest margins and profitability, while a strong capital structure served as a buffer against shocks. These studies show that income diversification and capital structure play a critical role in the effectiveness of monetary policy during periods of low interest rates.

Research conducted in developing countries (Kosmidou, 2008; Keskin, 2019; Kawamura, 2021) shows that bank-specific and macro variables are effective on profitability, and that central bank liquidity management and unconventional tools are becoming increasingly important. These findings indicate that monetary policy and regulations in developing economies are directly related to banking performance.

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Specifically for Türkiye, the literature exhibits temporal and methodological diversity. Uluyol (2019) and Karacan (2010) examined the effects of liberalization, privatization, interest and exchange rate fluctuations on banking profitability through historical and macroeconomic analyses. Yıldırım & Mirza (2020) and Türkmen, Üçay & Uzan (2021), on the other hand, analyzed the funding structure and the effects of crisis and pandemic periods on profitability in detail using panel regression methods and the application of ROK. Türkiye literature shows that the performance of the banking sector is affected by both structural and cyclical dynamics, and that a strong capital structure can limit negative impacts.

In the literature, there are limited comprehensive studies that examine the long-term effects of both conventional and unconventional monetary policy tools on the banking sector specifically in Türkiye. This study aims to analyze both short-term and long-term relationships for the period 2011–2024 using advanced econometric methods such as ARDL and the Toda-Yamamoto causality test, thereby aiming to fill a gap in the literature.

DATASET and METHODOLOGY

Dataset

In this study, the effects of conventional and unconventional monetary policies on the banking sector are examined. In this study, unlike previous studies, policies have been separated and macroeconomic variables have been added.

Table 1: Data Explanations

Dependent Variable		
Active Profitability Ratio	*ROA*	
Explanatory Variables		
Weighted Average Cost of Funding	*AOFM*	Traditional monetary policy variables
Reserve Option Mechanism	*ROM*	
Required Reserves	*ZK*	
Liquidity Operations	*L*	Unconventional monetary policy variables
Repo Operations	*R*	
Swap	*S*	
Industrial Production Index	*SUE*	Economic variables
Consumer Price Index	*TUFE*	
Basket Exchange Rate	*SK*	

In descriptive statistics, it is understood that the series shows a normal distribution because the null hypotheses cannot be rejected based on the Jarque-Bera probability values.

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Table 2: Descriptive Statistics

Series	Observation	Average	Maximum	Minimum	Standard Deviation	Jarque-Bera	Skewness	Kurtosis
ROA	168	0,903019	3,008309	0,070774	0,58837	37,40117	4,12385	1,00995
AOFM	168	14,77143	52,79000	4,52000	11,5761	213,8173	6,61427	2,09060
ROM	168	0.738095	1,00000	0,00000	0,440985	37,63184	2,17302	-1,08306
ZK	168	9,818452	17,00000	6,00000	2,121444	3,616658	3,02424	0,35919
L	168	6,037024	6,22000	5,41000	0,078775	4621,478	27,69069	-3,55602
R	168	8,573095	9,55000	7,15000	0,463754	22,9258	3,64155	-0,84610
S	168	0.255952	1,00000	0,00000	0,4377	38,9546	2,25098	1,11847
SUE	168	0,576607	18,66000	-29,32000	4,60883	1293,792	16,54968	-0,55534
TUFE	168	1,635417	13,58000	-1,44000	2,070045	887,5996	12,88295	2,69848
SK	168	8,775714	35,84000	1,81000	9,571918	94,37293	4,55397	1,66336

The descriptive statistics presented in Table 2 detail the distribution characteristics of the variables examined and the structural nature of the data. Among the analyzed series, the banking sector's asset profitability, weighted average funding cost, reserve option mechanism, liquidity operations, repo operations, S, industrial production index, consumer price index, and exchange rate basket stand out with high skewness and kurtosis values; this indicates that the distributions of these variables are right-skewed and have extreme values. Specifically, the extreme skewness (27.69) and low kurtosis (-3.56) values in the liquidity transaction series indicate a concentration of extremely high or low observations in the dataset, violating the normality assumption. Similarly, the active profitability and reserve option mechanism series also exhibit right-skewed distributions with positive skewness values (4.12 and 2.17, respectively). The series of required reserves, on the other hand, shows a more balanced distribution compared to other variables; the skewness (3.02) and kurtosis (0.36) values indicate that this series has a structure closer to normality. The Jarque-Bera test results also show that normality is not rejected in the series of required reserves. On the other hand, the high skewness (16.55 and 12.88) and kurtosis (-0.56 and 2.70, respectively) values in the industrial production index and consumer price index series indicate that these variables have extreme values and should be carefully considered in statistical analyses. The basket exchange rate series also exhibits a right-skewed distribution with extreme values (skewness: 4.55, kurtosis: 1.66). Generally, the distribution of most series deviates from normality, and using data transformation or non-parametric methods, especially for variables showing extreme skewness and kurtosis, will increase the accuracy of the analyzes. These findings support the importance of statistical corrections that can be applied in cases where the assumption of normality is violated in the literature (Gujarati & Porter, 2009; Wooldridge, 2015).

Pearson correlation coefficients indicate that there are positive and negative relationships between variables over time. However, the coefficients do not provide a clear statement about causality.

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Table 3: Correlation Coefficients

	ROA	*AOFM*	*ROM*	*ZK*	*L*	*R*	*S*	SUE	TUFE	SK
ROA	1.00									

AOFM	0.23090***	1.00								
	[0.0026]	---								
ROM	-0.3337***	-0.4595***	1.00							
	[0.0000]	[0.0000]	---							
ZK	0.16549**	-0.02960	0.038480	1.00						
	[0.0320]	[0.7032]	[0.6204]	---						
L	-0.16649**	-0.4035***	0.14112*	-0.37101***	1.00					
	[0.0310]	[0.0000]	[0.0679]	[0.0000]	---					
R	-0.05915	-0.13361*	0.04081	-0.32902***	0.70556***	1.00				
	[0.4463]	[0.0842]	[0.5988	[0.0000]	[0.0000]	---				
S	0.07809	0.37470***	-0.61200***	-0.43970***	0.21499***	0.28390***	1.00			
	[0.3143]	[0.0000]	[0.0000]	[0.0000]	[0.0051]	[0.0002]	---			
SUE	0.00740	0.01563	-0.01454	0.05551	-0.0075	-0.01932	0.013642	1.00		
	[0.9239]	[0.8406]	[0.8515]	[0.4746]	[0.9229]	[0.8038]	[0.8607]	---		
TUFE	0.13992*	0.31467	-0.47002	-0.28260	0.0031	0.16781	0.593391***	-0.03085	1.00	
	[0.0704]	[0.0000]	[0.0000]	[0.0000]	[0.9677]	[0.0297]	[0.0000]	[0.6995]	---	
SK	0.29810***	0.82690***	-0.76328***	-0.11731	-0.2607***	-0.00354	0.670167***	0.02891	0.54561***	1.00
	[0.0001]	[0.0000]	[0.0000]	[0.1298]	[0.0006]	[0.9633]	[0.0000]	[0.7091]	[0.0000]	---

Note: Values inside square brackets are p-values, with significance levels indicated as follows: *** for 1%, ** for 5%, and * for 10%.

The relationships between banking profitability and the variables are shown in Table 3. It is observed that there is a positive and significant relationship with the weighted average funding cost. As the cost of funding increases, profitability increases. The reserve option mechanism and liquidity operations are negative and significant. Profitability decreases as reserve option ratios and liquidity increase. The relationship between reserve requirements and profitability is positive and significant. When reserve requirements increase, profitability increases slightly. Liquidity transactions are negative and significant; when liquidity transactions increase, asset profitability decreases. There is no significant effect of repo and swap operations on active profitability. While industrial production is not related to active profitability, inflation positively affects active profitability. Additionally, active profitability increases when the currency basket rises.

The profitability of the banking sector's assets shows a negative correlation with the reserve option mechanism and a positive correlation with the weighted average funding cost and required reserves, which are traditional monetary policy variables. Among unconventional monetary policy variables, only liquidity operations negatively impact active profitability; the others do not appear significant.

Econometric Methods and Empirical Findings

The Augmented Dickey-Fuller (ADF) test, developed by Dickey and Fuller (1979), is an improved version of the Dickey-Fuller unit root test used to determine whether a time series contains a unit root. In this test, according to the null hypothesis H0, the series contains a unit root, meaning it is non-stationary; while according to the alternative hypothesis, the series does not contain a unit root and is therefore stationary. In this method, equation (1) represents the constant model, while equation (2) represents the constant-trend model.

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$$\Delta Y_t = \beta_0 + \theta Y_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta Y_{t-i} + u_t \quad (1)$$

$$\Delta Y_t = \beta_0 + \beta_1 t + \theta Y_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta Y_{t-i} + u_t \quad (2)$$

In the equations above; represents the dependent variable, β_0 is the constant term, t, is the trend, Y_{t-1} is the lagged difference term, k is the optimal lag length, and u_t is the error term. In this method, it is tested whether the coefficient θ is equal to zero. The calculated test statistic is compared to the MacKinnon table critical value to determine if the series is stationary. The PP test, developed by Phillips and Perron (1988), differs from the ADF test in that its error terms are not statistically independent, have a weak dependence on each other, and have a heterogeneous distribution instead of a homogeneous one. The equations for the test are given below.

$$Y_t = \alpha_0 + \beta_1 Y_{t-1} + \varepsilon_t \quad (3)$$

$$Y_t = \alpha_0 + \beta_1 Y_{t-1} + \beta_2 (t - T/2) + \varepsilon_t \quad (4)$$

Equations (3) and (4) mentioned above represent constant and constant-trend models, respectively. In this model: Y_t represents the tested variable, α_0 is the constant term, t is the trend, T is the number of observations, and ε_t is the error term. In this method, the value being tested is the coefficient β_1. As in the ADF method, the obtained value is compared to the MacKinnon critical table value to determine whether the series is stationary. Determining whether a series is stationary in time series analysis is of critical importance for ensuring that econometric models yield sound results. One of the tests developed in this context, the DF-GLS (Dickey-Fuller Generalized Least Squares) test, is frequently preferred because it has higher test power compared to the traditional Augmented Dickey-Fuller (ADF) test. This test was developed by Elliott et al. (1996) and aims to provide more reliable results, especially with small sample sizes.

$$\begin{aligned} ROA_t = \alpha_0 &+ \sum_{i=1}^{4} \beta_{1i} ROA_{t-i} + \sum_{i=1}^{4} \beta_{2i} AOFM_{t-i} + \sum_{i=1}^{4} \beta_{3i} ZK_{t-i} + \sum_{i=1}^{4} \beta_{4i} L_{t-i} + \sum_{i=1}^{5} \beta_{5i} R_{t-i} \\ &+ \sum_{i=1}^{5} \beta_{6i} SUE_{t-i} + \sum_{i=1}^{5} \beta_{7i} TUFE_{t-i} + \sum_{i=1}^{5} \beta_{8i} SK_{t-i} + \gamma_{1-i} MROA_{t-i} + \gamma_{2-i} AOFM_{t-i} \\ &+ \gamma_{3-i} ZK_{t-i} + \gamma_{4-i} L_{t-i} + \gamma_{5-i} R_{t-i} + \gamma_{6-i} SUE_{t-i} + \gamma_{7-i} TUFE_{t-i} + \gamma_{8-i} SK_{t-i} + \epsilon_{it} \end{aligned} \quad (5)$$

First, the stationarity of the variables was determined. The necessary pre-tests for the ARDL test have been conducted, and it can be seen in the tables below that all conditions have been met.

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Table 4: Unit Root Tests Results

Değişkenler	ADF		Phillips Perron	
	Contant t-sta.	Constant and Trend t-sta.	Contant t-sta.	Constant and Trend t-sta.
ROA	-0.157414 [0.9399]	-2.057.691 [0.5648]	-3.319.402 [0.0155]**	-6.048.528*** [0.0000]
AOFM	-2.041839 [0.2689]	-3.260552 [0.0766]	-0.460745 [0.8945]	-1.636689 [0.7743]
ZK	-0.897509 [0.7871]	-0.110502 [0.9944]	-1.336372 [0.6120]	-0.943531 [0.9475]
L	-1.026324 [0.7432]	-0.694676 [0.9712]	-5.581685*** [0.0000]	-5.546015*** [0.0000]
R	-1.948593 [0.3094]	-1.791890 [0.7042]	-4.323954*** [0.0000]	-4.236438*** [0.0049]
SUE	-17.45962*** [0.0000]	-17.41968*** [0.0000]	-23.97654*** [0.0000]	-24.20968*** [0.0000]
TUFE	-3.839382*** [0.0031]	-7.122153*** [0.0000]	-5.960827*** [0.0000]	-7.038085*** [0.0000]
SK	4.008320 [0.9644]	1.210347 [0.9399]	4.430623 [0.8533]	1.112270 [0.9998]
ΔROA	-3.080049** [0.0301]	-3.190499* [0.0901]	-17.14632*** [0.0000]	-17.01889*** [0.0000]
ΔAOFM	-4.795740*** [0.0000]	-4.848706*** [0.0000]	-9.359682*** [0.0000]	-9.456309*** [0.0000]
ΔZK	-5.285291*** [0.0000]	-5.827246*** [0.0000]	-13.12971*** [0.0000]	-13.19121*** [0.0000]
ΔL	-8.061313*** [0.0000]	-8.192636 [0.0000]	-5.581685*** [0.0000]	-5.546015*** [0.0000]
ΔR	-7.338602*** [0.0000]	-7.460769*** [0.0000]	-17.72429*** [0.0000]	-18.55551*** [0.0000]
ΔSK	-7.903510*** [0.0000]	-9.324782*** [0.0000]	-7.524572*** [0.0000]	-8.238120*** [0.0000]

Note: For the ADF test, the appropriate lag length was identified via the Schwarz Information Criterion (max 13), whereas the PP test bandwidth was determined using the Newey-West criterion. Values in parentheses indicate p-values; significance levels are represented by *** (1%), ** (5%), and * (10%).

The unit root test results are presented in Table 4. The series that are stationary at level (I(0)) are: the industrial production index and the consumer price index, while those that are stationary at first difference (I(1)) are: the profitability of the banking sector's assets, the weighted average funding cost, reserve requirements, liquidity operations, repo operations, and the exchange rate basket. According to this table, it can be seen that the series have different degrees of integration. The ARDL method was used in the analysis because it is a model that allows both I(0) and I(1) variables to be used in the same model.

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Table 5:ARDL Cointegration Test Results

Selected model(3, 1, 3, 4, 0, 4, 4, 3, 0, 1)			**AIC: 0.825540**	
		Asymptotic Critik Value		
F-istatistic	5.932707	**%10**	**%5**	**%1**
k	9	1.8	2.04	2.5
		2.8	2.08	3.68

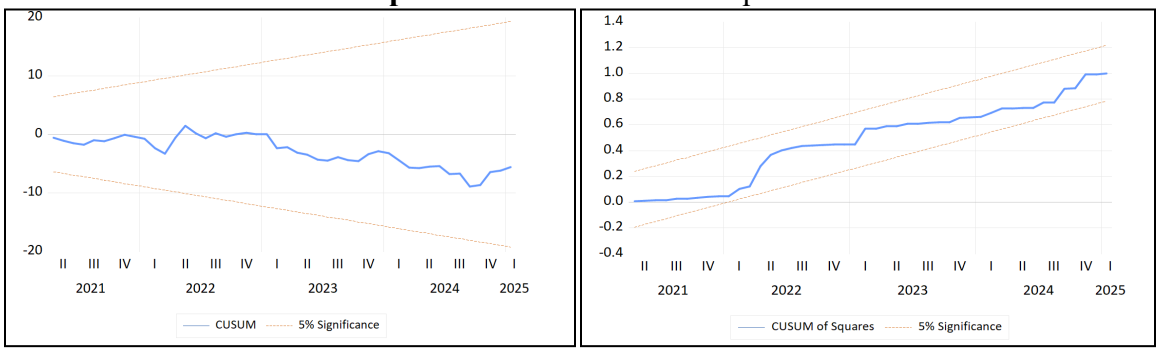
Note:***, %1 represents the significance level. Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. Critical values were obtained from the study by Pesaran et al. (2001). Optimum lag lengths were determined according to the Schwarz Information Criterion.

Table 6: Diagnostic Tests

Tests	**Statistics**	**Probability**
Jarqua Bera Normality		0.2744
Ramsey Reset	2.299165	0.1318
Cusum	İstikrarlı	
Cusumq	İstikrarlı	
Breusch-Godfrey LM Test	0.061924	0.9400
Breusch-Pagan-Godfrey	2.946997	0.1224

The results show that the model is working well and does not violate the basic assumptions. Under normal conditions, the model does not show form errors, structural breaks, autocorrelation, or heteroskedasticity. Cusum tests appear to be stable. Cusum tests and other diagnostic tests performed showed that the necessary preconditions for ARDL were met.

Graph 1: Cusum and Cusum-sq Tests



The ARDL model can simultaneously examine both short-term and long-term relationships between the dependent variable and the independent variables.

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Table 7: ARDL Long-Term Coefficients

Variable	Coefficient	t-statistic	P-value
R	-0.372366	-1.723264	0.0872*
ROM	-0.635320	-2.354549	0.0200**
S	-0.360216	-1.603347	0.1113
L	4.156496	2.085139	0.0390**
AOFM	0.010289	0.972337	0.3327
TUFE	-0.164561	-2.579419	0.0110**
SUE	0.004499	0.409580	0.6828
SK	0.013161	0.592809	0.5543
ZK	0.068745	2.142533	0.0340**
C	-21.24606	-1.933177	0.0554*

Note: The optimal lag length was determined using the Akaike Information Criterion (AIC). * %10, ** %5, *** %1 indicates significance.

In the ARDL model, the long-run coefficients indicate how much a change in the system's equilibrium affects the dependent variable. The coefficient of the L variable being at a level of 4.16 indicates that when there is a one-unit increase in L, the dependent variable will increase by approximately 4.16 units in the long run. Liquidity operations and reserve requirements positively impact the banking sector's asset profitability. The reserve option mechanism, repo transactions, and the consumer price index negatively affect it.

Table 8: ARDL Error Correction Model and Short-Term Coefficients

Dependent Variable: ROA			
Variable	**Coefficient**	**t-statistic**	**P-value**
D(ROA(-1))	0.318436	4.220.655	0.0000***
D(ROA(-2))	0.232707	3.112.624	0.0023***
D(REPO)	-0.056524	-0.466204	0.6418
D(REPO(-1))	0.800727	6.211.495	0.0000***
D(REPO(-2))	-0.063402	-0.450048	0.6534
D(REPO(-3))	-0.337527	-2.387.789	0.0184**
D(LIKIDITE)	0.639230	1.015.218	0.3119
D(LIKIDITE(-1))	-1.694.039	-2.434.350	0.0163**
D(LIKIDITE(-2))	-1.328.730	-1.863.296	0.0647*
D(LIKIDITE(-3))	1.496.481	2.204.420	0.0292**
D(FAIZ)	-0.024911	-1.083.451	0.2806
D(FAIZ(-1))	0.013825	0.646159	0.5193
D(FAIZ(-2))	0.051574	2.379.326	0.0188**
D(KUKLAREZ)	-0.008979	-0.035125	0.9720

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D(KUKLAREZ(-1))	0.169688	0.623333	0.5341
D(KUKLAREZ(-2))	-0.400606	-1.660.959	0.0991*
D(KUKLAREZ(-3))	0.512552	2.076.014	0.0398**
D(ENF)	0.057408	2.654.592	0.0089***
D(SEPETKUR)	-0.146765	-2.181.599	0.0309**
D(SEPETKUR(-1))	0.238931	3.258.769	0.0014***
D(SEPETKUR(-2))	0.297812	4.403.864	0.0000***
D(ZK)	-0.165003	-2.764.485	0.0065***
*CointEq(-1)**	-0.572245	-8.381.017	0.0000***

Note: * %10, ** %5, *** %1 indicates significance.

Upon examining Table 9, the error correction model is found to be negative and statistically significant. In Equation 9, it is stated that when the coefficient of the error term takes values between 0 and -1, there is a long-term approach to equilibrium (Narayan, 2004). The error correction model results show that the first and second period lagged changes in active profitability have strong and significant positive effects with coefficients of 0.318 and 0.233, respectively. The one-period lagged change in repo transactions shows a strong positive effect with a coefficient of 0.801, while the three-period lagged change has a negative and significant impact with a coefficient of -0.338. The one-period lagged change in liquidity transactions was found to be -1.694 (significant), the two-period lagged effect was -1.329 (significant at approximately the 10% level), and the three-period lagged effect was 1.496 (positive and significant). This situation indicates that liquidity has complex short-term effects on the profitability of the banking sector with different lags. The lagged change in the weighted average funding cost in the second period has a positive and significant effect with a coefficient of 0.052. The initial effect of basket exchange rate changes is negative and significant at -0.147, but the lagged effects in the first and second periods are strongly positive and significant at 0.239 and 0.298, respectively. The change in the consumer price index has a significant positive short-term impact with a coefficient of 0.057. Changes in required reserves show a significant negative impact in the short term with a coefficient of -0.165. The error correction term, CointEq(-1)* with a coefficient of -0.572, indicates a high speed of return to equilibrium and that approximately 57% of the one-period deviation is corrected in the short term. A delay length is needed for use in the Toda-Yamamoto test.

Table 9: Suitable Delay Length

Gecikme	LogL	LR	FPE	AIC	SC	HQ
0	-2096.703	NA	0.129383	26.33379	26.52599	26.41184
1	-693.0320	2614.338	1.0908	10.03790	12.15208*	10.89640
2	-514.8714	309.5540	4.1409	9.060893	13.09706	10.69984
3	-336.2772	287.9831	1.6009	8.078465	14.03661	10.49786
4	511.4663	252.1720*	5.5311*	3.731671*	19.29974	10.05332*

The following abbreviations are used: LR = Sequential Modified LR Test Statistics, FPE = Final Prediction Error, AIC = Akaike Information Criterion, SC = Schwarz Information Criterion, HQ = Hannan-Quinn Information Criterion.

The findings from the VAR model indicated that the optimal lag length was determined to be 4, based on the LR, FPE, AIC, and HQ criteria. However, the SC criterion suggested a lag length of

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2. Since the Akaike Information Criterion (AIC) was used in the unit root test, it was also taken into account when selecting the lag length. Ultimately, the appropriate lag length (k) was concluded to be.

Table 10. Toda-Yamamoto Test Results

Direction of Cause-and-Effect	Chi-Square Test Statistic	Chi-Square Probability Value	Decision
AOFM → ROA	5.611726	0,2300	The analysis found no indication of causality.
ROM → ROA	**22.87955**	**0,0001**	**A causal relationship exists between the variables.**
ZK → ROA	5.346471	0,2545	The analysis found no indication of causality.
L → ROA	**12.01806**	**0,0172**	**A causal relationship exists between the variables.**
R → ROA	**46.20141**	**0.0000**	**A causal relationship exists between the variables.**
S → ROA	2.726411	0,6046	The analysis found no indication of causality.
SUE → ROA	3.037093	0,5516	The analysis found no indication of causality.
TUFE → ROA	**29.07098**	**0,0000**	**A causal relationship exists between the variables.**
SK → ROA	**29.86935**	**0,0000**	**A causal relationship exists between the variables.**

Note: Delay Length m=4 d_{max}=1 (m+ d_{max}=5)

According to the Granger causality test performed using the Toda-Yamamoto method, it was concluded that there is a significant causal relationship from the reserve option mechanism variable to the profitability of the banking sector's assets. Additionally, causal relationships were observed between liquidity transactions, repo transactions, the consumer price index, the exchange rate and the profitability of the banking sector's assets. On the other hand, it was found that there is no causality between the weighted average funding cost, reserve requirements, exchange rate basket, and industrial production index variables and the profitability of the banking sector's assets.

CONCLUSION and EVALUATION

While the results show that the weighted funding cost and reserve requirements among traditional monetary policy variables have a positive impact on asset profitability, the negative effects of the reserve option mechanism and repo transactions are noteworthy. While these results demonstrate the complex and directional effects of monetary policy on banking profitability, similar findings can occasionally be found in the literature. For example, an increase in reserve option ratios can reduce banks' margins, while effective management of mandatory reserves and liquidity regulation can make a positive contribution. In this context, the results appear to be consistent with the literature. The observed lagged effects of liquidity operations and the basket exchange rate in the error correction model indicate the time-varying and sometimes inverse effects of monetary policy. This study makes a unique contribution to the literature by quantitatively demonstrating the effects of conventional and unconventional monetary policy tools on the banking sector. The findings serve as a useful guide for policymakers, indicating that liquidity and reserve requirement policies support active profitability, while some instruments may have a negative impact.

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Considering the evidence of the study and recent developments in the Türkiye economy, it is evident that traditional monetary policy tools, particularly tightening interest rate policies and reserve requirements, have a more effective and predictable impact on the profitability and stability of the banking sector. Recently, the central bank's decision to raise the policy interest rate from 8.5% to 50% has restored confidence in the banking system and attracted global investor interest, thereby increasing access to external funding and strengthening foreign exchange reserves. Additionally, the termination of costly instruments such as foreign exchange-protected deposits (KKM) has reduced the potential for creating financial burdens and uncertainty in monetary policy, and has facilitated long-term planned liquidity management for banks. The study shows that the reserve option mechanism and liquidity operations (non-traditional instruments) negatively impact asset profitability, while reserve requirements and funding costs (traditional instruments) have a positive effect. In this context, policymakers focusing on disciplining monetary policy by prioritizing traditional tools, strengthening central bank communication and transparency, and gradually phasing out uncertainty and cost-generating instruments will not only increase the profitability of the banking sector but also support financial stability.

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