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Revisiting the bank lending channel in Turkey under the unconventional monetary policy framework

Geleneksel olmayan para politikası çerçevesinde Türkiye'de banka kredi kanalının yeniden gözden geçirilmesi

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Abstract

This paper provides empirical evidence regarding the bank lending channel under Turkey's unconventional monetary policy framework. Towards this end, the impact of changes in monetary policy stance on bank credit growth is investigated using a dynamic panel data modelling approach between 2011 and 2019. The empirical results reveal cross-sectional heterogeneity in the loan supply of Turkish banks following a change in monetary policy, which implies an operative bank lending channel in the post-2010 period of the policy mix. Small, liquidity-constrained, and inadequately capitalized banks tend to experience sharper contractions in their lending during monetary policy tightening episodes. Besides, in terms of bank-specific characteristics, the findings demonstrate that larger bank size and capital is associated with a higher loan supply. On the contrary, liquidity is found to harm bank lending.

Keywords: Bank Lending, Credit Channel, Monetary Policy, Transmission Mechanisms, Turkey

Jel Codes: E44, E52, G21

Öz

Bu çalışma Türkiye'de uygulanan geleneksel olmayan para politikası çerçevesinde banka kredi kanalının etkinliğine yönelik ampirik kanıt ortaya koymayı amaçlamaktadır. Bu doğrultuda, para politikası duruşundaki değişikliklerin banka kredi büyümesi üzerindeki etkisi 2011 ve 2019 arasındaki dönemi kapsayacak şekilde dinamik panel modelleme yöntemi kullanılarak araştırılmaktadır. Ampirik sonuçlar para politikası değişikliğini takiben Türk bankaların kredi arzında kesitsel farklılıklar olduğunu göstermekte, bu da 2010 sonrası politika bileşimi uygulaması döneminde banka kredi kanalının etkinliğine işaret etmektedir. Daha açık bir şekilde, küçük, likiditesi düşük ve sermayesi kısıtlı bankalar parasal sıkılaşma dönemlerinde daha keskin kredi daralması yaşama eğilimindedir. Bunun yanı sıra, bankalara özgü özellikler bağlamında sonuçlar, banka büyüklüğü ve yüksek sermayenin daha yüksek kredi arzına yol açtığını, buna karşılık likiditenin ise banka kredisi üzerinde negatif etkisi olduğunu ortaya koymaktadır.

Anahtar Kelimeler: Banka Kredileri, Kredi Kanalı, Para Politikası, Aktarım Mekanizmaları, Türkiye

JEL Kodları: E44, E52, G21

Introduction

In the wake of the global financial downturn and subsequent recession, a series of accommodative monetary policy measures implemented by most advanced countries gave rise to a surge in global liquidity, resulting in rapid credit growth and an increase in investor risk appetite. As regards emerging countries, the initiation of the quantitative easing programs has fostered massive and volatile short-term capital inflows from developed ones. During this period, these emerging countries observed a considerable fall in interest rates, loosening credit standards and excessive credit growth.

Along with various macroprudential measures, many unconventional monetary policy tools have also been implemented by Turkish authorities since 2010 to curb the behaviour of the financial sector. Specifically, in the previous conventional approach, price stability was considered the objective during policy interest rate as an instrument. In the new post-crisis approach, price stability and financial stability are considered the objectives. At the same time, policy interest rate, interest rate corridor and liquidity management are determined as the instruments for achieving those objectives. Implementing these unconventional tools in the new policy framework put the credit channel at the forefront of the monetary transmission mechanism. Moreover, the credit channel significantly affects the aggregate economic activity in Turkey, given that the ratio of credit to national income stands at 66 percent as of 2021. Yet, as Kara (2012) put forward, the credit channel is expected to play an even more critical role in financing consumption and investment. Moreover, it is the primary transmission mechanism to impact inflation dynamics and the output gap. In that respect, exploring the effectiveness of the credit channel may offer particularly worthful insights into the design and conduct of the monetary policy.

Against this background, the past decade, in which the Turkish banking sector has been operating in such a macroeconomic setting, deserves particular attention and provides an interesting case to examine whether an operative bank lending channel exists empirically. Along these lines, this paper elucidates the effect of unconventional monetary policies on the lending behaviour of Turkish deposit banks from 2011-2019. Therefore, this research aims to shed light on whether there has been a change in the bank lending channel's functioning and reassess the banks' role in monetary transmission, given the changes in the monetary policy framework in Turkey at the onset of the global financial turmoil.

As a result of credit market imperfections, banks of different types have diverse abilities to access alternative funding sources and shield their credit portfolios after a monetary tightening-induced shortage in their available funds. Therefore, by changing the external funds' cost, a monetary policy shock is transmitted differently by banks with different characteristics. Put differently, the impact of a monetary tightening episode on the loan supply tends to be more pronounced for banks facing tighter constraints in their access to external financing sources. Hence, one could study this cross-sectional variation to determine the effect of monetary policy shocks on the credit supply response. To draw a parallel with the previous literature on the bank lending channel of monetary policy transmission (Ehrmann, Gambacorta, Martinez-Pages, Sevestre and Worms, 2003; Gambacorta, 2005; Kashyap and Stein, 2000; Kishan and Opiela, 2000), this paper investigates whether the responses to changes in monetary policy stance differ according to banks with different characteristics. In this way, this study detects the influence of unconventional monetary policy on loan growth in Turkey.

Deploying quarterly information from individual banks, this study explores the bank-specific characteristics of the banking industry's lending behaviour and the existence of bank lending channel of monetary policy in Turkey in the aftermath of the global financial crisis. In an attempt to do so, it investigates cross-sectional heterogeneity in the response of Turkish banks with different characteristics to monetary policy shocks for the period covering 2011-2019. Hereunder, it could be inferred whether the bank lending channel of the monetary transmission mechanism is operating under the unconventional monetary policy framework implemented so far. A dynamic panel model is estimated by controlling for macroeconomic factors and adopting bank-specific characteristics, namely size, liquidity and capitalization.

This paper's contributions to the empirical literature on the bank lending channel of monetary transmission are expected to be in several ways. At the outset, to the best of our knowledge, this study is the first to provide evidence on the bank lending channel under an unconventional monetary policy environment in Turkey using bank-level data. Moreover, it addresses the banking industry's role in the monetary policy transmission for Turkey in particular, but also for an emerging market in general, when left behind nearly ten years after the credit crisis.

The remainder of the paper is organized as follows: The next section provides background information on Turkey's unconventional monetary policy framework in the post-2010 period. The third section reviews the empirical studies in the literature on the bank lending channel in Turkey. The fourth section

outlines the data, econometric model and methodology used in the analysis. The fifth section exhibits and discusses the primary empirical evidence. Lastly, the final section gives a conclusion.

A brief account of unconventional monetary policy in Turkey

In the wake of the global financial crisis in 2008, the political practices experienced in the advanced countries' economies have caused their economic and monetary policies to be questioned. Financial stability cannot be assured even when those policies achieve their goals has led policy-making institutions to seek alternatives. Traditional policies failing to manage the crisis led central banks to adopt unconventional policy measures during recovery. In parallel with the increased importance of financial stability after the global crisis, the Central Bank of the Republic of Turkey (CBRT) has customised its monetary policy strategy according to the requirements of the new era and diversified its policy instruments.

The ongoing climate of uncertainty regarding global liquidity and economy, caused by the expansionary monetary policies conducted in advanced countries during the recovery period, has led to more volatile capital flows for emerging and developing economies. As a result, Turkey has experienced disruption in the current account balance and increased short-term capital inflows in this process. Short-term increase in foreign capital inflows has, on the one hand, facilitated access to credit by households and corporations through the banking system. However, on the other hand, the nominal Turkish lira has appreciated due to the Lehman crisis, causing a divergence between domestic and foreign demand. Accordingly, rapid disruption of the current account balance and use of short-term capital inflows to ensure financing has increased the economy's sensitivity towards sudden changes in the global risk appetite, raised concerns about the macroeconomic and financial stability, and required an alternative policy approach.

In 2010, the CBRT adopted a new monetary policy framework focusing on financial stability and price stability to limit macro-financial risks caused by these developments (Başcı and Kara, 2011). In this context, variables such as credits and exchange rates were followed, and credit growth, in particular, was highlighted as a critical component of financial stability. Accordingly, various policies were implemented to ensure that the economic dynamics realize credit growth. In addition, credit expansion and short-term capital inflows, which might threaten financial stability, were determined as intermediate objectives during this period. In this respect, three policy instruments, namely, policy interest rate, required reserve ratios and interest rate corridor, were used to achieve these intermediary objectives and ensure price stability and financial stability. Notably, by implementing the new policy mix and inflation-targeting regime, CBRT has become one of the first central banks to pursue financial stability (Özatay, 2011).

In the new post-crisis approach, required reserves are an effective policy instrument used by CBRT for maintaining financial stability. Required reserves help reduce volatility in short-term interest rates and manage credit volume by adjusting the number of viable credit funds the banks possess. Thus, it aims to increase the central bank's control over the domestic money supply and strengthen liquidity management.

Another instrument included in the new approach is the Reserve Option Mechanism, which allows for a certain amount of the required reserves in the Turkish lira to be converted into a foreign currency or gold. This mechanism was used to reinforce foreign exchange reserves, provide banks with more volatile liquidity management, and soften the impacts of fluctuations in capital inflows on foreign exchange and financial markets. In addition, this mechanism allows banks to use their foreign exchange assets freely following their liquidity needs.

Another new policy instrument that CBRT developed to support financial stability without trading off price stability is the asymmetrical interest rate corridor. An asymmetrical interest rate corridor, in short, indicates that the area between the CBRT's borrowing/lending rate and the policy interest rate should be used as an additional policy instrument. Using an interest rate corridor separates CBRT from the central banks, which apply traditional methods targeting inflation. In the traditional sense, an interest rate corridor is a thin symmetrical band related to policy interest rates, which usually does not change and is utilised to prevent significant differentiation between market interest rates and policy interest rates. Put differently, and the interest rate corridor has a passive role in the standard implementation. However, the present system of the CBRT considers the interest rate corridor an active tool and utilizes it accordingly. If required, the CBRT can change the interest rate's parameters and create an asymmetrical structure in the policy interest rate. In this system, the interest rate corridor facilitates a more rapid and adjustable response to volatility in capital movements in the short term (Binici, Erol, Kara, Özlü and Ünalmış, 2013). To put it differently, it should be noted that the system the CBRT

adopted is significantly different from a traditional interest rate corridor system. In this regard, unlike the traditional corridor systems, in which the market rate is closer to the policy rate, the system that belongs to the CBRT shows that systematic differences extensively exist between interbank rates and policy rates. Moreover, by utilizing the corridor width effectively as an additional policy tool, CBRT's policy enables the corridor's higher and lower boundaries to vary in rate and direction. This is opposite to the framework of a traditional policy, in which the financial authority modifies the corridor parameters in the same direction and magnitude as the primary policy rate. Notably, it could be stated that the difference between policy rates and market rates is an intentional result created by the traditional corridor policy that the CBRT utilizes instead of increasing market spreads during crises (Binici, Kara and Özlü, 2016).

Literature review

The theoretical background of the credit view of monetary policy transmission mechanism posits that, under informational frictions in the credit market and imperfect substitutability of retail deposits and another source of funds, there exists an external finance premium, which is defined as the gap between the cost of internal and external borrowing for firms. It may change according to the changes in monetary policy stance. Hence, monetary policy may affect the real economy apart from the interest rate by changing the external finance premium. Along these lines, as one of the sub-channels of the credit view, the bank lending channel concentrates on how monetary policy impacts the loan supply of depository institutions (Bernanke and Gertler, 1995).

Empirically many studies explore whether there exists an operational bank lending channel and whether the findings are consistent with the theoretical expectations. Following different approaches and adopting different methodologies, these studies examine the role of banks in monetary policy transmission, either for a single country or for a sample of more than one country. Nonetheless, while there is rich empirical literature analysing the bank lending channel of monetary transmission, the research focusing on Turkey is sparse. Moreover, it provides different results depending on the methodology utilized and the period under consideration.

Çavuşoğlu (2002) investigates the lending behaviour of Turkish banks between the years 1988 and 1999. Generalized Method of Moments estimation results reveals weak evidence for the presence of a bank lending channel. Balance sheet strength and asset quality are significant bank-specific factors in determining lending behaviour. In contrast, no significant size impact of a policy change on loan supply responses is detected.

Aktaş and Taş (2007) empirically examine the relationship between monetary policy changes and banks' loan supply, emphasising the capital adequacy ratio. The analysis covers the period of 2001-2006. The results show that capital-constrained and unconstrained banks react differently to monetary policy shocks suggesting an operative bank lending channel through capital adequacy ratio.

To determine if there is an operational bank lending channel in Turkey, Brooks (2007) adopts a difference-in-difference approach. She investigates Turkish banks' credit supply in response to the monetary tightening resulting from the May-June 2006 financial turmoil. The empirical results indicate that banks can play a role in amplifying the influence of monetary policy on the Turkish economy. Moreover, bank liquidity emerged as a significant determinant of loan supply.

Aydın and Igan (2012), using bank-level data from 2002 to 2008, examine the effect of monetary and fiscal policy on loan growth. Two-step regression results reveal that a monetary tightening has more power to restrict domestic currency-denominated loans. Another study finding is that banks experience sharper declines in short-term credit during the contractionary monetary policy. Moreover, banks with less liquidity reduce their lending in response to monetary tightening. Overall, the study's results provide statistically weak evidence for an operative bank lending channel for the period under investigation.

Using the instrumental variable approach, Alper, Hulagu, and Keles (2012) empirically investigated the effect of bank-specific and systemic liquidity on bank lending in the Turkish banking system during 2002-2011. The study's results point out banks' liquidity positions, alongside sector-wide liquidity, as important determinants of credit supply. However, a statistically insignificant interaction between the bank liquidity and monetary policy variables asserts no evidence for an operative bank lending channel of monetary transmission between 2002 and 2011.

Çatik and Karaçuka (2012) explored Turkey's credit transmission channel using a Threshold Vector Autoregression model from 1986-2009. Relying on a nonlinear estimation framework, the purpose is to determine whether there is a change in the operation of credit channels under different inflationary

regimes. The results display the limited impact of monetary shocks on loan supply, especially in the post-inflation targeting era.

Özşuca and Akbostancı (2013) investigated the effect of monetary policy on credit growth between 1988 and 2009. The empirical analysis builds on cross-sectional heterogeneity in banks' lending supply responses using the size and CAMEL-type variables to appeal to a bank's financial health. The analysis is further carried out for the sub-periods 1988-2001 and 2002-2009 to reveal whether there has been a change in the efficacy of the bank lending channel given the changes in the macroeconomic fundamentals and implementation of reforms following the 2001 crisis. The estimation results show that the bank lending channel is operative in both periods, but its impact is stronger post-crisis. Furthermore, among bank-specific characteristics, size, liquidity, capitalization, asset quality and managerial efficiency are statistically significant in determining the bank's lending behaviour during 2002-2009. On the other hand, significant coefficients emerge for only earnings capability and asset quality in banks' response to monetary policy changes for the period before the 2001 crisis. Notably, our study is methodologically in the spirit of Özşuca and Akbostancı (2013).

Deploying the Bayesian stochastic frontier technique, Partovi and Matousek (2018) analyse the bank lending channel in Turkey covering the period 2002-2016. In addition, the analysis considers two sub-periods, 2002-2008 and 2008-2016, to elucidate whether an operational credit channel exists in the aftermath of the restructuring program implemented following the 2000-2001 economic crises. The study's results suggest bank lending channel is effective in the monetary transmission mechanism in Turkey during the period under investigation.

Turguttopbaş (2019) investigates the transmission of monetary policy rates in Turkey considering the period 2001-2017. Ordinary Least Squares and Generalized Linear Model estimation results show that the lending rate of Turkish banks has been affected by the change in policy rate with a lag of three months, while this takes through its impacts on deposit rates within two months. Further, the panel Ordinary Least Squares estimations reveal that the loan supply is affected by the Central Bank's policy rate and liquidity.

As time series applications of monetary transmission, more recent studies by Uslu and Karahan (2016), Serel and Güvenoğlu (2019) and Kılınç and Kılınç (2020) empirically explore the bank lending channel in Turkey based on Vector Autoregressive Model. The results of impulse response functions in both studies display evidence favouring an operative bank lending channel in the Turkish economy.

Considering the above empirical literature on the bank lending channel in Turkey, it could be seen that existing research has not analysed the effectiveness of this channel in the post-2010 period of the unconventional monetary policy framework. In this sense, this paper aims to fill this gap, and the study's results may broaden empirical evidence on this issue.

Data set, econometric model and methodology

To examine whether banks with different characteristics react differently to changes in monetary policy stance, the following empirical specification is considered:

$$\Delta(L_{i,t}) = \alpha_i + \gamma\Delta(L_{i,t-1}) + \theta\Delta MP_{i,t} + \phi\Delta GDP_t + \eta CPI_t + \beta X_{i,t-1} + \varpi\Delta MP_{i,t}X_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

with *i=1,……,N* and *t=1,……, T* where *N* is the number of banks and *T* is the final quarter. α_i is the time-invariant bank-specific effects. Using equation (1), this study attempts to test the main hypothesis: Is there an operational bank lending channel in Turkey under the unconventional monetary policy framework?

$\Delta(MP_{i,t})$ denotes the monetary policy indicator included as an explanatory variable to capture the impact of the change in the unconventional monetary policy on bank lending. The choice of the monetary policy indicator is of particular importance since the main thrust of the analysis is to capture the impact of changes in unconventional monetary policy stance on loan growth. It was assumed that the policy rate was a meaningful indicator of short-term funding costs in financial markets before the global economic crisis. However, with the unconventional interest rate corridor applied after the crisis, it is now possible for short-term market interest rates to significantly digress from policy rates. Especially in Turkey, this divergence is an intentional outcome of the funding strategy applied as part of the unusual interest rate corridor adopted by the CBRT. In other words, the systematic divergence of market rates from CBRT rates is a conscious policy choice in line with the wide interest rate corridor and the flexible funding strategy applied. Binici, Kara and Özlü (2016) presented empirical findings that the banks in Turkey take the effective interest rates as a point of reference rather than the official interest rates announced by the Central Bank when forming their loan and deposit rates. The study's results also

show that a single interest rate cannot represent the monetary stance taken after 2011. Instead, the monetary policy stance could be considered by considering interbank interest rates, which are part of effective rates, and weighted average funding rates. Accordingly, two alternative measures for unconventional monetary policy are used in line with CBRT'S new policy mix that started to be implemented after the global financial turmoil. The first one is the weighted average cost of the CBRT funding. The second one is BIST's overnight repo/reverse repo interest rates. The coefficients for these monetary policy indicators are expected to be negative.

Following the previous literature, real GDP growth, ΔGDP, and inflation rate, CPI, are incorporated into the empirical specification to control macroeconomic factors. Specifically, real GDP growth accounts for the business cycle condition. The positive course of economic activity is anticipated to increase bank lending, so the estimated value of the coefficient attached to real GDP growth is expected to be positive. The inflation rate is incorporated as the other macroeconomic control variable into the specification since inflation may significantly impact the volume of loans. In particular, higher inflation rates reduce bank lending by lowering the real rate of return on credit. High inflation rates may even result in credit rationing. Hence, inflation is expected to harm bank lending, while the expected sign of the coefficient is negative.

$X_{i,t}$, is a vector comprising three bank-specific characteristics that could affect bank lending supply in the case of monetary policy changes. As standard bank-specific control variables in the related literature, liquidity, capitalization and bank size are included in the empirical specification. Liquidity (LIQ) is calculated as the ratio of liquid assets to total assets. Capitalization (CAP) is expressed as the ratio of shareholders' equity to total assets, while bank size (SIZE) is proxied by the natural logarithm of total assets. These bank-specific characteristics provide information on the relationship between financial strength and loan growth and the bank's ability to insulate loan supply from policy-induced deposit outflows. Towards this end, the bank-specific characteristics are interacted with the change in the monetary policy indicators to reveal whether there exists a heterogeneous response of banks with different characteristics to shocks in monetary policies. More specifically, banks with lower liquidity and capitalization are expected to experience a sharper decline in lending due to a contractionary monetary policy shock. Similarly, smaller banks tend to be more constrained in their access to external funds; therefore, they are more likely to lower their supply of loans following a monetary tightening. The estimated value of the coefficient of the interaction variables is the primary focus of the analysis.

Quarterly bank-level data have been gathered from balance sheets and income statements from the Banks Association of Turkey for commercial banks, which have been operative from 2011q1-2019q4. The period beyond 2020 is excluded to abstract from COVID-19 ensued extraordinary policies and the likely structural break resulting from the pandemic. The sample does not cover investment and development banks, as they do not collect deposits and have a different organizational structure; hence they do not entirely fall within the theoretical framework of the bank lending channel. In this respect, an unbalanced panel is composed to include all Turkish commercial banks that have been active for at least one year during the period under investigation. Then, the data set was organized by detecting and deleting outlier observations. The final sample is highly representative since it constitutes 93 percent of the total assets of the Turkish banking industry as of 2019.

Apart from the bank-level data, macroeconomic data used in the econometric model, namely, the weighted average cost of the CBRT funding and overnight repo/reverse repo interest rates in BIST, are obtained from the electronic data delivery system of CBRT. In addition, reel GDP and inflation rate are extracted from the OECD Economic Outlook database. Therefore, while the variables utilized in the empirical analysis and the explanations of these variables are displayed in Table 1, the descriptive statistics are provided in Table 2.

Table 1: Description of the Variables

Variable	Notation	Description
Loans	L	Logarithm of total loans (millions)
Monetary policy 1	WACF	Weighted average cost of the CBRT funding interest rate
Monetary policy 2	BIST	Overnight repo/reverse repo interest rates in BIST
Real GDP	GDP	Quarterly changes in real GDP at constant 1998 prices, seasonally adjusted
Inflation	CPI	Growth rate in inflation measured by consumer price index with 2015 base year
Liquidity	LIQ	Liquid assets/ total assets
Capitalization	CAP	Shareholders 'equity/ total assets
Size	SIZE	Logarithm of total assets (million)

Table 2: Summary Statistics of the Variables

Variables	No. of Observations	Mean	Std. Dev.	Min.	Max.
L	1105	8.79	2.69	0.05	12.86
WACF	1139	9.88	4.56	5.11	25.06
BIST	1139	10.38	3.77	5.46	23.88
GDP	1139	1.22	1.65	-3.20	4.90
CPI	1139	9.38	3.55	4.34	22.37
SIZE	1133	9.27	2.32	3.91	13.22
LIQ	1139	37.87	23.25	8.60	99.80
CAP	1139	20.40	21.88	3.70	99.90

The direction of causality between the banking sector and monetary policy is not clear, i.e. the situation of the banking sector may be influential on monetary policy decisions. Hence, to obtain consistent estimates on the role of banks in the monetary policy transmission in Turkey in the post-2010 period, the dynamic Generalised Method of Moments (GMM) panel methodology developed by Arellano and Bover (1995) and Blundell and Bond (1998) is utilized. In the presence of bank-specific fixed effects and possible endogeneity of regressors, this methodology gives efficient and unbiased estimates, provided that the dynamic regression model is not subject to second-order serial correlation and that the instruments that have been utilized are valid. Accordingly, AR tests are applied to check for first, and second-order autocorrelation and the Sargan test of over-identifying restrictions are used to evaluate the instruments' validity. Moreover, bank-specific characteristics are demeaned and, as a further precaution for endogeneity, enter into a specification with one lag. Other than that, to ensure robustness, the model is estimated using yearly observations, yet the results do not change significantly and hence are not reported for brevity.

Estimation results

Table 3 demonstrates the estimation results for the credit supply model given in equation (1). In addition, the results comprising two different monetary policy indicators, i.e., the weighted average cost of the CBRT funding and overnight repo/reverse repo interest rates in BIST, are depicted as Model 1 and Model 2, respectively.

Table 3: Estimation Results

	Model 1 (WACF)		Model 2 (BIST)	
	Coefficient	Standard error	Coefficient	Standard error
WACF	-0.0282***	0.0464		
BIST			-0.0194***	0.0126
GDP	0.0094**	0.0005	0.0036**	0.0004
CPI	-0.0208**	0.0013	-0.0137***	0.0012
LIQ	-0.0123***	0.0007	-0.0251***	0.0019
CAP	0.0289***	0.0009	0.0155***	0.0034
SIZE	0.4118***	0.0239	0.3177***	0.0435
LIQ*WACF	0.0039***	0.0003		
CAP*WACF	0.0099***	0.0002		
SIZE*WACF	0.0578*	0.0036)		
LIQ*BIST			0.0097***	0.0014
CAP*BIST			0.0005*	0.0001
SIZE*BIST			0.0498***	0.0029
No of observations	1047		1047	
Sargan test (p-values)	0.502		0.228	
AR(1), AR(2) (p-values)	0.009, 0.734		0.030, 0.764	

Note: ***, **, * indicate that significance levels of 1%, 5%, 10 % respectively.

As Table 3 shows, the findings from both models suggest that monetary policy changes significantly affect the lending behaviour of Turkish banks. More specifically, credit supply decreases with contractionary monetary policy, which is in line with the bank lending channel of monetary transmission. This finding indicates that the unconventional approach adopted by the CBRT since the end-2010 is practical for loan supply. In other words, alternative tools and specific corridor systems implemented in this policy mix period seem to impact credit volume significantly.

The macroeconomic control variables, *GDP* and *CPI*, have statistically significant coefficients in both specifications, which indicate that real GDP growth and inflation affect the loan supply. The coefficients for *GDP* have positive signs, as expected. The results confirm that more favourable economic conditions and growth in real GDP led to an increase in credit volume. Indeed, it is not surprising to see that economic activity increases credit growth. However, it could also be the case that a rise in economic output raises credit demand by increasing the purchasing power of economic agents and their likely consumption and investment activities. However, the inflation rate works in the opposite direction. Consistent with a priori expectations, the coefficients attached to *CPI* turned out as unfavourable. This finding suggests that increasing inflation leads banks to extend fewer loans. As a result, higher inflation rates may cause a reduction in the purchasing power of individuals and businesses, resulting in lower demand for credit, and banks may reduce their loan supply accordingly.

Regarding bank-specific characteristics, positive and significant coefficients are estimated for capital and size, while conversely, negative and significant coefficients emerge for liquidity in both models. In other words, bank size and degree of capitalization support bank lending, whereas liquidity impinges negatively on loan supply. The positive and significant coefficient attached to bank size implies that the bigger a bank is, the more it extends credit. This result is not surprising since smaller banks have limited access to external funding sources relative to their bigger counterparts and are less likely to extend loans. Looking at the relationship between bank-specific variables and loan supply, capital emerges as another important determinant of credit supply. Banks holding higher capital levels are less constrained in their access to external funds due to their high perceived creditworthiness. Overall, size and capital appear to increase the lending capacity of banks. However, as regards the relationship between loan growth and liquidity, the results suggest that banks with higher liquidity are more likely to reduce their

lending activity, which is contrary to a priori expectations. In other words, bank liquidity may undermine loan supply. This may stem from the favourable system-wide liquidity and, thereby, funding conditions that prevail in the post-2010 period. More specifically, domestic funding conditions improved due to the ample liquidity of the banking system, which may reduce banks' desire to raise precautionary liquidity. This finding is consistent with Alper et al. (2012), which put forward that Turkish banks determine their credit supply by considering their level of liquidity and systemic liquidity.

Generally, the interaction coefficients between changes in monetary policy and bank-specific characteristics have statistically positive signs. This finding indicates that more extensive, more liquid and strongly capitalized banks find it easier to raise external funds and thus supply credit. In other words, the impact of monetary policy seems to be more pronounced for the lending behaviour of these banks. To put it differently, smaller, less liquid and weakly capitalized banks are more constrained regarding their ability to access alternative funding sources during tighter monetary policy conditions. Smaller and weakly capitalized banks are more likely to suffer from informational frictions in financial markets, which makes raising unsecured deposits more expensive. At this moment, they find it hard to shield their loan supply from the effect of a monetary tightening. Similarly, as they rely less on cash and securities and thus have limited access to external funds, illiquid banks tend to decline credit supply during contractionary monetary policies. As a result, these banks are less able to mitigate the adverse impact of the monetary shocks and thereby curtail their credit supply more than the other banks. In other words, the findings regarding the distributive effects of monetary policy imply that a contractionary monetary policy restricts loan supply. At the same time, this constraint gets more vital for banks with less capital, liquidity ratios and banks of smaller size. Thereby, bank size, degree of capitalization and liquidity emerge as bank-specific sources of asymmetric responses in lending behaviour following a change in monetary policy stance. Overall, as the key measures of the empirical analysis, the statistically significant coefficients of interaction terms imply the heterogeneous responses of loan supply among Turkish banks, which asserts the existence of a bank lending channel of monetary transmission in Turkey from 2011 to 2019.

Conclusion

Following the 2008 global financial crisis, CBRT added financial stability to its plan and adopted a different monetary policy framework for alternative tools. Against this background, this paper attempts to provide evidence for an operational bank lending channel under this unconventional monetary policy framework using cross-sectional variation among banks. Towards this end, the impact of monetary policy on loan growth is explored using bank-level data from the first quarter of 2011 to the last quarter of 2019.

The empirical results from dynamic panel model techniques reveal that a contractionary monetary policy causes a decline in the credit supply of Turkish banks, as expected. Concerning the impact of macroeconomic controls on credit supply, findings show that bank lending improves with the positive course of economic activity. On the contrary, inflation is negative and significant, suggesting that higher inflation reduces bank credit growth. Bank capital, size and liquidity emerged as essential determinants of Turkish banks' credit supply during 2011-2019. In particular, bigger and better-capitalized banks are more likely to increase their lending. However, quite surprisingly, bank liquidity impacts negatively on credit supply according to the estimation results. Furthermore, the significance of the interaction between change in monetary policy and bank-specific variables indicates that Turkish banks' ability to shield credit supply is different. Small, liquidity-constrained, and inadequately capitalized banks are likely to experience sharper contractions in their lending during monetary policy tightening episodes. Overall, based on the different responses of loan supply across banks, the study's empirical results assert a bank lending channel to be effective during the post-2010 period of the policy mix.

In the aftermath of the global financial meltdown, CBRT added financial stability to its schedule while monitoring credit growth became particularly important. Given the role of credit growth on financial stability, coupled with the dominance of banks in the Turkish financial system, the credit channel is expected to become even more important for this period. After that, illuminating the potency of the bank lending channel is likely to become particularly interesting for Turkey, where CBRT implemented a new policy framework with a diversified set of alternative policy tools. Along these lines, the results obtained in this study offer new insights into the role of banks in monetary transmission in this period of the policy mix. Moreover, this study contributes to the relatively scant empirical literature about the credit channel of monetary transmission mechanism within the scope of unconventional monetary policy setup in the context of an emerging market economy. It might be interesting to explore the efficacy of bank lending channels in the aftermath of the 2008 global financial crisis for other economies,

either on a single country or multi-country basis, to shed light on the relationship between banks and monetary transmission mechanisms in this era of unconventional policies. Further evidence may provide important guidelines to policymakers. Moreover, further studies can take into account different bank characteristics or different types of loans to improve our understanding of the credit channel of transmission mechanism, which could play a crucial role in the design of macroeconomic policies, including credit support schemes. Investigating the impact of macroprudential policies on lending supply may also provide helpful information for regulators.

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