An investigation of the impacts of asset ratio policy on the banking system during the Covid-19 crisis in Turkey

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Abstract

Purpose – This paper provides a quantitative assessment of the "asset ratio" rule defined in Turkey as part of measures taken to stimulate the economy amid the Covid-19 pandemic. The main objective of the new rule was to boost credit growth in the economy and provide lending for credit-constrained households and firms that are in need. A secondary aim was to shift the denomination structure of the deposits toward domestic currency. Hence, the paper focus particularly on how the policy affected the growth rate of loans and the share of domestic deposits relative to foreign ones among the commercial banks. The policy was also heavily criticized due to the possibility that it will subjugate the banking system to excessive risk. The paper explore this possible impact by measuring how much the policy affected the default risk allowances in the banking system.

Design/methodology/approach – The new policy required banks with deposits above a threshold level, i.e. large banks, to maintain a certain asset ratio. Banks with deposits below the threshold, i.e. small banks, were held exempt from it. The paper implement a difference-in difference methodology to assess the quantitative impacts of the asset ratio policy by taking large banks as the treatment group, and small banks as the control group.

Findings – Difference-in-difference estimation results suggest that the asset ratio policy resulted in a 9.6% rise in loans and an 8.4% rise in government securities. Deposits also increased, with no significant change in their composition. The policy initially generated a 7% increase in the credit risk allowances of banks in the treatment group, which vanished in the following periods. Based on all these, the paper argue that the policy was successful in providing liquidity to the economy without jeopardizing the financial stability.

Research limitations/implications – The findings of this study show that asset ratio policy is effective in increasing credit growth in countries with limited policy space such as Turkey. While saying this, the importance of the robust and prudent structure of the banking system in the economy should be underlined. Otherwise, the policy may have an unintended consequence of raising systemic risk. The policy suggestions also apply to advanced countries where the monetary policy has reached a natural limit due to the zero lower bound (ZLB). The ZLB problem encouraged these countries to use quantitative easing schemes in the aftermath of the Covid-19 crisis, just like the global financial crisis. However, it may take a long time to undo the effects of this policy on the balance sheets of central banks. In such cases, asset ratio policy can also be considered as an alternative tool for advanced economies notwithstanding the fact that the banking system should be prudent, well-capitalized and the country should have enough fiscal space. The main objective of the asset ratio policy was to help SMEs that were in urgent need of liquidity at the beginning of the crisis. The bank balance sheet data used in this paper does not contain information about the borrowers of the loans extended during the implementation of the policy. Analysis of this dimension using matched bank-firm level data will better demonstrate the success of the policy in achieving this goal. The paper address this as the main limitation of the paper and leave that analysis for future research.

Originality/value – This paper provides an important contribution to the literature by assessing a new unique policy whose objective is to stimulate loans and mitigate the impact of the Covid-19 crisis on the

JEL Classification — G21, G28, G38

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economy. The policy in question is predicted to have effects on the asset and liability structure and risk exposure of the banking system in Turkey. The quantitative analysis in this study estimates these impacts and discusses the effectiveness of the new policy in providing a relief for firms and households in need. Whether or not the policy caused a disruption in the sound structure of the banking system in Turkey is another question addressed in the paper.

Keywords Asset ratio, Banking system, Covid-19, Credit growth, Credit risk, Prudential policy
Paper type Research paper

1. Introduction

The Covid-19 pandemic induced a "dangerously unique" economic crisis, which devastated global economies (Borio, 2020). According to the most recent estimates of the World Bank Group, the global economy has shrunk by 4.3% in 2020 (World Bank, 2021). As the spread of the pandemic accelerated in countries across the globe, policymakers had to make decisions that involved important trade-offs. On the one hand, they had to enact public health measures to contain the spread of the virus and to save people's lives. On the other hand, these measures forced many businesses to either pause their operations or scale-down their capacities. To avoid the potential harm to the economy, especially in the most vulnerable sectors, the consensus among policymakers worldwide was implementing "bold anti-recession measures" (Baldwin and Weder di Mauro, 2020).

The pandemic hit developed countries amid ongoing efforts to boost their inflation levels. Having learned their lessons from the global financial crisis, central banks in these countries reacted promptly to the sudden and deep economic downturn after the pandemic. As a first step, the already low short-term rates were reduced down to near-zero levels in advanced economies. Similar action was taken by central banks in the developing countries, as well. Due to the limited space of the conventional policies and the urgent need to support the real economies and maintain financial stability, central banks had to resort to unconventional tools during this period. The main objective of these policies was to ease the lines of credit and provide a lifeline to the most distressed segments of the economy, which included the financial sector and the non-financial sector (English *et al.*, 2021).

The Turkish economy was in a fragile condition at the onset of the pandemic. The economy was struggling with "chronically high" inflation and there was heavy dependence on external finance. CPI inflation was far above its 5% target, and the inflation expectations were anchored at double-digit levels. The weak and vulnerable economic outlook made the country more susceptible to the declining global risk appetite and left little room for policy maneuver. A strong monetary easing was not possible due to fears of triggering capital outflows and bringing inflation to unprecedented levels (Kara, 2021).

Due to the limited extent of the conventional monetary policy, alternative tools were needed to maintain the flow of funds to the economy and keep households and firms afloat. The "asset ratio" rule was one of the novel policies devised during this period in Turkey. The Banking Regulation and Supervision Agency (BRSA) announced the rule on April 18, 2020. The "asset ratio", which gave the rule its name, was defined as the weighted sum of loans, securities and foreign exchange swap operations of banks with the Central Bank of Turkey (CBRT) divided by the sum of their domestic and foreign deposits. The foreign deposits had a higher weight in the denominator of the ratio, whereby the policy aimed to punish the foreign currency denomination of the deposits. BRSA required selected commercial banks to hit a target asset ratio of 80%–100% each month. The banks that fail to meet this criterion would be subject to severe penalties. The rule was deemed "controversial" since it was a major intervention to the loan market and encouraged risk-taking in the private banking sector, which contradicted the usual prudent approach (Kara, 2021).

This paper puts the novel "asset ratio rule" under scrutiny and aims to clarify the following questions: How much growth in loans was achieved by implementing the rule? Did the banks prefer more to expand their loans or try to achieve the target by extending the other margins such as securities, FX swap sales? Taking into account the fact that loan growth is mainly financed by deposit growth in Turkey, how was the total amount of deposits and their composition affected from the rule? Moreover, there were many objections and complaints from the banking industry regarding the fact that the asset ratio rule was pushing the loan market beyond its market equilibrium. The banking sector raised their concerns that this would lead to heightened credit risk and fragilities in the financial system. Our analysis also addresses these claims. We assess the impact of the new rule on the banking system's exposure to risk by measuring how much the credit risk allowances changed in the aftermath of the policy.

Our quantitative analysis results show that loans increased by 9% in response to the policy. This result can be interpreted as the policy having a rapid and immediate effect on loan growth. The government security holdings of the banking sector also rose by 8.4%, which signals banks used their margin on securities nearly as much as they did on loans to achieve the target ratio. The asset ratio was also expected to impact the deposits, shifting their composition away from foreign denominated ones. Our results point to a rise in deposits after implementing the policy, which is mainly attributed to the fact that banks in Turkey are dependent on deposits to finance their loans. Lastly, the analysis regarding banks' risk exposure shows that during the first quarter after the implementation of the policy, there was a slight increase in the credit risk in the banking system. This effect later vanished in the following periods.

A quantitative evaluation of the asset ratio rule displays the policy's success in triggering loan growth and avoiding an elevated risk exposure of the banking sector. A careful assessment of such new policies is essential as it provides insights into whether they can be included in the toolbox of policymakers in similar situations. In fact, crises generate both challenges and opportunities for all economies and policymakers. The challenge is to devise policies or use the existing ones appropriately to mitigate the impact of the crisis. The opportunity is that new tools designed to respond to each crisis prepare the countries and economies for the next and increase their resilience. It is thus imperative that policymakers learn from each other's experiences and engage in a synergy based on lessons drawn from previous experiences. In that sense, the findings in our paper have valuable policy implications regarding whether the new policy can be included in the toolbox of policymakers in future crises, not just for Turkey or similar emerging market economies (EMEs) but also for advanced economies facing the zero lower bound (ZLB) problem in their monetary policy.

2. Literature review

The asset ratio policy is a novel tool to ease the credit conditions for firms and households that face severe difficulties in maintaining their operations in the aftermath of the Covid-19 shock.

Different from other policies implemented during this period, in which central banks or governments have been the main executors, commercial banks acted as key actors in the asset ratio rule, bearing all the possible risks that may arise due to this policy.

This article provides an assessment of how much loan growth has been achieved with the new policy. Moreover, we address the concerns regarding the instabilities that may arise in the financial system by evaluating whether or not the asset ratio rule exposed the commercial banks to higher levels of risk. Thus, our analysis contains practical and valuable insights on the benefits and costs of a new policy that has the potential to be included in the toolbox of countries needing different and innovative policies in crisis times.

The questions addressed in our paper are related to several strands of the literature. We contribute to the literature discussing the right mix of policies in the post-COVID-19 period by evaluating a policy used to combat the pandemic-induced economic shock. Elgin *et al.* (2020) develop a policy stimulus index using IMF Covid-19 Policy Tracker data. Baldwin and Weder di Mauro (2020) present a collection of papers that provide a guideline for policymaking and discuss specific country examples implemented in the aftermath of the shock. A more recent study by English *et al.* (2021) compiles the advanced and emerging country experience on monetary policy and central banking in response to Covid-19. Borio (2020) explains the policies undertaken and warns against the limited room for fiscal and monetary policy maneuver as an outcome of these policies. Loayza and Pennings (2020) discuss the guidelines of the right mix of policy for developing countries and point out that "demand-oriented macroeconomic policy" may have a weak impact. They argue that priority must be given to policies that support the most vulnerable.

Curdia (2020) examines the effectiveness of conventional monetary policy in the United States, which faces the limitations of the ZLB, to mitigate the impacts of the Covid-19 shock and suggests that a rapid decline in the federal funds rate would be the right response. Cavallino and De Fiore (2020) evaluate the response of monetary authorities in advanced economies to Covid-19. They argue that the complementary aspects of fiscal and monetary policies were useful in controlling their costs. The expansion of central bank balance sheets in these countries is expected to have sizable footprints. Hutchinson and Mee (2020) examine the asset purchases and targeted longer-term refinancing operations by the ECB. They conclude that these policies were effective and did not expose the economy to further risks in the future. Benmelech and Tzur-Ilan (2020) discuss the determinants of monetary and fiscal policies for both advanced and emerging economies. Their empirical analysis reveals that the lower the central bank base rate at the onset of the shock, the less room there is in the use of conventional monetary policies. On the other hand, they show that countries that encounter the pandemic with high-interest rates are limited in their ability to use non-conventional tools.

Bhar and Malliaris (2021) analyze FED's unconventional policies in the aftermath of the global financial crisis and document their impact on reducing unemployment. Moreover, they infer some policy lessons for the Covid-19 pandemic shock. Fleming *et al.* (2020) also summarize the policies undertaken by the FED to mitigate the economic impacts of the pandemic. They argue that the higher speed and magnitude of FED's reaction to the Covid-19 shock compared to the global financial crisis is both due to the severity of the shock and the experience gained and lessons learned from the global financial crisis. In addition to monetary and macro-prudential policies, numerous papers provide an evaluation of the fiscal policy measures against the pandemic shock (see Giovannini *et al.* (2020), Shah (2020), Makin and Layton (2021)). The current paper differs from all these studies by examining a new policy where the private financial sector rather than monetary or fiscal authorities are the key actors and the economic stimulus takes place directly rather than through a transmission channel as in the case of an expansionary monetary policy.

The main objective of the asset ratio policy was to stimulate credit growth during the time that it was implemented. Hence, our analysis on how effective the policy is in achieving this goal makes the current paper part of earlier literature that examines the impacts of similar policies on credit growth. The link between monetary policy and loans extended by commercial banks in an economy is theorized in the "bank-lending channel" of the transmission mechanism of the monetary policy. As revealed by its name, this channel is centered on the financial intermediary roles of banks and it is more important in countries where banks constitute the main source of funds for the non-financial sector. In this channel, an expansionary monetary policy increases the amount of banks reserves and deposits, raising the amount of loans extended to firms. The key assumption underlying this channel is that the securities and loans are not perceived as perfect substitutes by banks. Therefore,

monetary policy actions that affect the liability side of the banks' balance sheets are balanced on the asset side by changing the loans of the commercial banks.

There exists a vast literature exploring the bank lending channel empirically. Among the earlier studies come Bernanke and Blinder (1988), Bernanke and Blinder (1992), Bernanke and Gertler (1995), Kashyap and Stein (1994) and Hubbard (1994). These studies all provide evidence on the existence of the bank-lending channel for the US economy using aggregate data. A seminal paper by Kashyap and Stein (2000) uses cross-sectional variation in the liquidity of US commercial banks and shows that the lending behavior of banks with less liquid balance sheets is affected more by monetary policy. Their results also support the existence of a bank lending channel in the US economy.

Similar studies have been conducted for Turkey, as well. In analyzing these studies, we need to note that monetary policy shifted gears in Turkey in the aftermath of the global financial crisis. After CBRT started the transition to an inflation targeting (IT) regime after the 2001 crisis, the main focus of the CBRT was to bring inflation under control. During this period, the main policy tool was the one-week repo rate of the Central Bank. The global financial crisis gave rise to different policy concerns both in advanced and in emerging economies. Emerging economies received intensive inflows of capital in the aftermath of the crisis. Hence, financial stability became an important issue, and it became part of the goals of monetary policy in these countries, Turkey being one of them. Credit growth was the main indicator for financial stability in the new policy mix, and the toolbox was extended to include active use of the interest rate corridor, liquidity management, required reserves (Kara, 2012). The modified monetary policy framework was implemented until June 2018. Thereafter CBRT announced the transition of the monetary policy to a more simplified one until the country was hit with the Covid-19 shock.

Earlier studies that use data on the pre-IT regime period report mixed evidence, mostly pointing out a weak effect of the monetary policy on the loan supply. These studies attribute the failure of the bank lending channel to the fact that the necessary conditions for healthy functioning of this channel are not met (see Inan (2001), Cavusoglu (2002), Cengiz and Duman (2008) and Sengonul and Thorbecke (2005)). Later studies that use pre-global financial crisis data include Cambazoglu and Gunes (2011), which reports that changes in the policy rate are effective on banks loans, specifically on the loans extended to SMEs. Uslu and Karahan (2016) also reach similar conclusions regarding the existence of a bank lending channel. The results reported for the post-global financial crisis period are also mixed. Incekara and Amanov (2018) find that during 2010–2017 period, the required reserve ratio and the width of the interest rate corridor had a significant impact on credit growth, but the average funding rate and the policy rate are ineffective in stimulating loans. On the other hand, Serel and Güvenoğlu (2019) report contrary findings for the 2011–2018 period. The interest rate pass through, which measures how much loan and deposit rates are affected by changes in the monetary policy rate, is an important channel to understand since the cost of credit is an important determinant of its growth rate. Cavusoglu (2010) and Aydin (2007) are two papers investigating this channel for Turkey. Both studies focus on the earlier periods of the IT regime in the country. Cavusoglu (2010) report a 50–80% response of the loan rates to changes in the policy rate and the speed of the pass through is measured as 3–5 months Aydin (2007) confirms these findings in Cavusoglu (2010) and reports that the pass through occurs in about 3 months Binici, Kara and Ozlu (2016) conduct a similar analysis using bank-level data for the 2011–2014 period. Their results show that there is a strong asymmetry in the response of loan and deposit rates to changes in the short-term policy rates. Loan rates respond more to a tight monetary policy than a loose monetary policy. Deposit rates, on the other hand, react symmetrically to changes in the monetary policy stance. They conjecture that the asymmetry in the reaction of loan rates to monetary policy is due to the non-competitive structure of the banking sector in Turkey. Banks in Turkey have some degree of

market power, which allows them to act more sluggishly in revising their loan rates downwards in response to an easing in monetary policy compared to an upward revision of these rates during a contractionary monetary policy.

Besides monetary policy, the impact of macro-prudential policies on the lending behavior of banks is also studied in the literature. Cerutti *et al.* (2015), use data on 119 countries, note that tight macro-prudential measures reduce both commercial and consumer loan growth, and the said effect is higher on consumer loans. Using Turkish banking sector data, Alper *et al.* (2014) analyze the effect of required reserve ratios on banks' loan growth. This study shows that while a tightening in this ratio generally reduces credit growth, it has less impact on banks with high liquid assets ratios.

Abbasoglu *et al.* (2020) investigate the impact of both monetary and macro-prudential policies on the growth rate of loans extended by Turkish commercial banks between 2002 and 2015. They group banks as small and large according to their asset levels and analyze consumer and commercial loans separately. They report that macro-prudential measures affect the commercial loans extended by small banks but that these policies do not affect the loans extended by large banks. We investigate in this paper a new policy tool that aims to stimulate loan growth directly as opposed to monetary or macro-prudential policies that work through indirect channels. Hence our analysis offers the opportunity to evaluate and compare the effects of this new tool that can be used as an alternative to monetary policy.

The new asset ratio rule was criticized heavily, especially by the banking sector, on the grounds that it would expose the banking system to a high degree of risk. Different from earlier policies stimulating credit growth, the asset ratio rule offered a stick to the banks that failed to increase their loans up to a satisfactory level. Thus, our analysis of the new policy's impact on the commercial banks' risk exposure contributes to this strand of the literature, which evaluates the fragilities caused by higher loan growth and policies stimulating it. Two commonly used measures of the riskiness of the banking system are the loan loss provisions and the ratio of non-performing loans to total loans in the literature. Keeton (1999) examines US banks between 1982 and 1996 and finds that loan growth leads to higher loan loss provisions in the subsequent periods. The same question has been addressed across other countries and the results of these studies verify this finding (see Hess *et al.* (2009), Kashif *et al.* (2016), Laidroo and Mannasoo (2013), Foos *et al.* (2010), Dang (2019)). Laeven and Majnoni (2003) and Cavallo and Majnoni (2001) reach contrary results. They document a negative relation between credit growth and loan loss provisions.

Baziki and Capacioglu (2021) analyze two recent policies – namely, loan to value ratio cap and credit guarantee schemes – son the lending behavior of banks in Turkey. Using bank-firm-loan level data, they find that Turkish banks act prudently and give fewer loans to firms that are riskier and have weaker relationships with the banks. Hence, both policies have enhanced the financial stability in the economy.

Giese and Haldane (2020) and Demirguc-Kunt *et al.* (2020) are two papers that study the vulnerabilities of the financial system in the post-pandemic global economy. The former argues that the global banking system has performed well thanks to the strong capital and liquidity buffers they had built in the aftermath of the global financial crisis. On the other hand, Demirguc-Kunt *et al.* (2020) use a global dataset on policy responses to Covid-19 and bank stock prices and find that the crisis and the rise in bank lending imposed by policies resulted in underperformance of the banking sector in stock markets. Their results show that these adverse effects are aggravated for undercapitalized banks and/or banks operating in countries with limited fiscal space. Our analysis contributes to this strand of the literature by evaluating the potential costs of a new credit enhancing policy hence providing policymakers guidance on whether or not or at what cost they can implement the alternative policy.

We organize the remainder of the paper as follows. In Section 3, we provide the progress of the pandemic and economic measures taken in Turkey and explain in detail the asset ratio

policy. In section 4, we explain the data and methodology. Finally, in section 5, we present and discuss our results and conclude the paper in section 6.

3. Economic measures during the pandemic and asset ratio policy

To counteract the economic damage of the public health measures on the economy, many governments, including Turkey, used a mix of fiscal, monetary and macro-prudential policies.

The Turkish government announced the first stimulus package, worth 100 billion TL, on March 18, 2020. This package was primarily fiscal in nature (Demiralp, 2020). Besides these fiscal measures, the Central Bank of the Republic of Turkey (CBRT) also stepped in and announced a 100 basis points decline in the policy rate on March 17, 2020. This expansionary monetary policy was reinforced with additional prudential and monetary policies taken by the CBRT (2020) [1].

The asset ratio (AR) rule was introduced right after the pandemic outbreak, in an environment where the policymakers were quickly searching for ways to avoid the economy from a deep sink. The details on the rule were announced by the Banking Regulatory and Supervisory Authority (BRSA) on April 18, 2020.

According to the new policy, as of May 2020, BRSA would require banks to calculate the "asset ratio (AR)" on a weekly basis according to the following formula [2].

$$AR = \frac{Loans + (Securities * 0.75) + (CBRT\ \ Swap * 0.5)}{Domestic\ \ Deposits + (FX\ \ Deposits * 1.25)}$$

In the numerator of the ratio loans refer to all commercial and consumer loans excluding non-performing loans and securities represent all the bonds and *T*-bills issued by the government and private sector, excluding stocks and securities issued by non-domestic residents. CBRT swap stands for the foreign currency given by banks to CBRT through swap operations. The denominator consists of domestic deposits, which are Turkish Lira (TL) denominated deposits except for the deposits of banks, and foreign deposits include foreign currency (FX) denominated and gold deposits.

Banks subject to this policy would calculate the monthly average of this ratio. This average value was required to be 100% for deposit banks and 80% for participation banks. Banks that failed to hit the target would be subject to deterrent fines (BRSA, 2020) [3].

The asset ratio policy excluded investment and development banks and commercial banks having less than 5 billion TL worth of total deposits as of March 31, 2020 (BRSA, 2020) [4]. Banks with deposits less than 25 billion TL were also exempt from the policy on June 1, 2020 (BRSA, 2020) [5]. The ratio was lowered by 5% points in August and October. Eventually, it was abolished as of the end of December, 2020 (BRSA, 2020) [6].

4. Data and methodology

4.1 Data and sample description

We use quarterly unconsolidated balance sheet and off-balance sheet data of commercial banks for the 2018q1-2020q4 period [7]. It is an unbalanced panel dataset covering 37 commercial banks. Table 1 presents some descriptive statistics of the sample. Banks are grouped according to their deposit levels on March 31, 2020, as large, medium and small [8]. In the sample, there are 16 large, 10 medium and 11 small banks. There is a large discrepancy in average assets, credits, securities, foreign currency swap sales and deposits of these bank groups. Each of these items is tenfold in large banks compared to medium banks, and they are at least a hundred times more compared to small banks. Credits account for almost two-thirds

	Large	Medium	Small
Number of banks (level)	16	10	11
Total Asset (billion TL)	143	13	2.04
Total Credits (billion TL)	88.80	8.10	0.94
Total Deposits (billion TL)	86.10	8.13	0.98
Government Securities (billion TL)	23.60	1.24	0.27
Currency swap Sales (billion TL)	14.70	1.75	0.19
Credit to Asset Ratio (level)	0.64	0.63	0.35
TL to FX Deposits Ratio (level)	1.53	1.29	519

Table 1. Sample descriptive statistics

Note(s): All data except for the number of banks, TL/FX deposit ratio and Credit/Asset ratio is expressed in billion TL

of all the assets in the two top groups, whereas they are only one-third of the total assets in small banks.

The variation among bank groups in terms of the domestic and foreign currency composition of the deposits is also noteworthy. The deposit composition of large and medium banks resembles each other, with domestic deposits being 1.3 to 1.5 times more than foreign currency ones. The deposits of small banks on the contrary, imply a lower level of dollarization with the domestic deposits being 500 times more than foreign ones.

4.2 Methodology

We implement a difference-in-difference methodology to assess the quantitative impacts of the asset ratio policy. This methodology calculates the effect of an exogenous change in the environment (i.e. treatment) on an outcome variable by taking the difference between the average change over time of the outcome for a specific group that was affected from the treatment (i.e. treatment group) from the other group which was not exposed to this change (control group).

For a general formulation, consider the following model

$$y_{ist} = \gamma I_s + \lambda d_t + \beta D_{s,t} + \varepsilon_{ist}$$

Here i, s, t denote the individual, the group (treatment or control) and time, respectively. y_{ist} are observations of the outcome variable for each individual i in group s, and time t. I_s and d_t are indicator variables for the group s and time period t that observation i belongs to. $D_{s,t} = I_s * d_t$ is an interaction dummy variable that marks the observations belonging to the treatment group during the post-treatment period. From this exposition, we get the following conditional means;

$$E\{y_{ist}|I_s = control, d_t = pre - treatment\} = 0$$

$$E\{y_{ist}|I_s = control, d_t = post - treatment\} = \lambda$$

$$E\{y_{ist}|I_s = treatment, d_t = pre - treatment\} = \gamma$$

$$E\{y_{ist}|I_s = treatment, d_t = post - treatment\} = \gamma + \lambda + \beta$$

where $E\{\varepsilon_{ist}|s, t\} = 0$.

Our parameter of interest is β which measures the effect of the treatment. We can express this parameter in terms of the difference between two differences of these conditional means as follows [9];

$$(E\{y_{ist}|I_s = treatment, d_t = post - treatment\} - E\{y_{ist}|I_s = treatment, d_t = pre - treatment\}) - (E\{y_{ist}|I_s = control, d_t = post - treatment\} - E\{y_{ist}|I_s = control, d_t = pre - treatment\}) = \beta.$$

The regression formulation of the difference-in-difference model enables one to add additional controls to the regression set up (Angrist and Pischke, 2008, p. 175). We modify the general model expressed above and use it in our setting based on this.

The asset ratio rule, by design, created a treatment group, i.e. the large banks, since only banks with deposits above a threshold level were subject to the policy. We distinguish between medium and small banks since medium banks were partially affected by the policy during its first month of application. Hence, we categorize medium banks as the partial-treatment group and small banks as the control group.

The modified difference-in-difference regression to measure the impact of the policy on various outcome variables is as follows:

$$\ln outcome_{iyq} = \beta_o + \beta_1 large_i * Post\_treatment_{yq} + \beta_2 medium_i * I_{2020q2} + \eta_i + u_y + \nu_q + \varepsilon_{iyq} \quad \text{(Eq. 1)}$$

Here i denotes individual banks, y denotes year and q represents the quarters. We regress the independent variable of interest ($\ln outcome_{iyq}$), for each bank i, in year y and quarter q on an interaction term ($large_i * Post_{treatment\,yq}$), between the large bank dummy ($large_i$), a post-treatment dummy ($Post\_treatment_{yq}$) and on the interaction between a medium bank dummy ($medium_i$) and an indicator variable for 2020q2 (I_{2020q2}). We control for bank, year and quarterly fixed effects, which are denoted by the terms η_i, u_y and ν_q, respectively.

The coefficient of interest in this equation is β_1, which quantifies the impact of the treatment. This coefficient estimates how much the outcome variable in large banks differs from small banks during the post-treatment period. The hypothesis we are testing for this coefficient is

$$H_o: \beta_1 = 0$$

$$H_1: \beta_1 \neq 0$$

A rejection of the null hypothesis implies that the asset ratio policy significantly impacted the variable of interest in large banks vis-à-vis small ones. Similarly, we can define the hypothesis that we are testing for β_2 or the partial treatment effect. In the case of rejecting the null hypothesis shows that balance sheet items in medium banks that were exposed to the asset ratio policy for only one-quarter were affected significantly by the policy as compared to the control group of small banks.

5. Results

The estimation results of Equation (1) are presented in Tables 2–4 for various outcome variables. The first three columns of Table 2 illustrate the results for items in the numerator of the asset ratio. Columns 4, 5 and 6 display the results for the denominator items, i.e. total, domestic and foreign deposits.

The main target of this policy is to avoid possible liquidity problems in the private sector due to the Covid-19 shock by stimulating credit growth. Column 1 shows the results of the regression analysis where the dependent variable is logged value of total loans. These results show that loans of banks in the treatment group increased on average by 9% more than banks in the control group. Estimates of β_2 coefficient show no evidence of a significant

Table 2.
Estimation results of the impact of asset ratio policy

Dependent Variables	(1) Credit	(2) Security	(3) Currency Swap Sale	(4) Total Deposit	(5) Domestic Deposit	(6) Foreign Deposit
Medium bank × 2020q2	−0.049 (0.049)	0.411** (0.181)	−0.239 (0.195)	−0.038 (0.059)	−0.179 (0.119)	−0.029 (0.073)
Large bank × Post 2020q1	0.096*** (0.019)	0.084* (0.048)	0.008 (0.075)	0.073** (0.032)	0.072* (0.037)	0.059* (0.033)
Constant	18.982*** (0.004)	17.498*** (0.011)	17.670*** (0.018)	18.954*** (0.007)	18.191*** (0.006)	18.285*** (0.008)
Observations	425	385	315	443	443	437
R-squared	0.993	0.972	0.915	0.990	0.989	0.983
Bank Fixed Effect	YES	YES	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES	YES	YES
Quarter Fixed Effect	YES	YES	YES	YES	YES	YES

Note(s): Robust standard errors in parentheses. *** indicates significance at 1%, ** indicates significance at 5%, * indicates significance at 10%. Regressions are weighted using the total deposits of each bank in 2020q1

Dependent Variables	(1) Domestic/FX Deposit	(2) Credit/Security	(3) Credit/Deposit	(4) Security/Deposit
Medium bank × 2020q2	−0.015 (0.026)	−0.366*** (0.128)	−0.012 (0.032)	0.057** (0.026)
Large bank × Post 2020q1	0.012 (0.014)	0.018 (0.035)	0.023 (0.021)	0.008 (0.008)
Constant	0.669*** (0.003)	1.716*** (0.008)	0.028*** (0.005)	0.215*** (0.002)
Observations	437	385	425	443
R-squared	0.833	0.814	0.806	0.828
Bank Fixed Effect	YES	YES	YES	YES
Year Fixed Effect	YES	YES	YES	YES
Quarter Fixed Effect	YES	YES	YES	YES

Note(s): All ratios are in log terms. Robust standard errors in parentheses. *** indicates significance at 1%, ** indicates significance at 5%

Table 3. Impacts of the asset ratio policy on selected ratios

Dependent variable: Log allowance for expected credit losses	(1)	(2)
Medium bank × 2020q2	−0.430 (0.255)	−0.420 (0.256)
Large bank × Post 2020q1	0.025 (0.034)	
Large bank × 2020q2		0.070** (0.034)
Large bank × 2020q3		0.017 (0.037)
Large bank × 2020q4		−0.010 (0.042)
Large bank × 2021q1		0.110 (0.170)
Large bank × 2021q2		0.049 (0.182)
Constant	15.854*** (0.009)	15.916*** (0.030)
Observations	401	466
R-squared	0.978	0.977
Bank Fixed Effect	YES	YES
Year Fixed Effect	YES	YES
Quarter Fixed Effect	YES	YES

Note(s): Robust standard errors in parentheses. *** indicates significance at 1%, ** indicates significance at 5%

Table 4. Impacts of the asset ratio policy on allowances allocated for expected credit losses

increase in medium bank loans vis-à-vis small ones. The reason for the insignificant partial treatment may be that medium banks were exposed to the policy only during the first month of 2020q2. Moreover, these banks might have chosen to increase their securities to maintain the asset ratio policy during their short period of treatment rather than extending more loans.

Besides stimulating credit growth, the asset ratio policy also encouraged treated banks to purchase securities. The results in column 2 of Table 2 display the impacts of the policy on government securities. The government securities of large banks raised by 8.4% more compared to the small banks in the aftermath of the asset ratio rule. The impact of the policy on government securities is nearly as big as that of loans, indicating that large banks used their margin on the secure components of the asset ratio as much as they did on loans. The estimates of the partial treatment effect on government securities show that the medium banks expanded their government securities by 41% more compared to small banks in 2020q2. This finding is consistent with the insignificant impact of the policy on the credit growth of these banks. Medium-sized banks, which had to comply with the asset ratio rule for a short time, achieved this by loading into the securities item instead of increasing their loans.

The results for the currency swap sales presented in column 3 show no significant effect of the policy on this item. The reason banks in the treatment group behaved this way can be the volatility in the value of the Turkish Lira during this period [10]. The plummeting in the value of domestic currency created a lack of confidence, which might be why banks did not increase

their currency swap sales significantly after the imposition of the asset ratio. Similar to loans, medium banks do not differ from small banks in their swap sales of foreign currency.

The formula of the asset ratio was designed so that foreign deposits were punished more severely with a higher coefficient. Hence, changing the domestic and foreign currency balance in total deposits was another way banks could opt for while trying to maintain the ratio. Banks had less control over the amount of deposits on their balance sheets but still put forth efforts to shift the composition of deposits by decreasing the interest rate on foreign currency denominated deposits. An example of such an attempt came from a commercial bank that declared that it would raise the lower bound of the amount that can be deposited in interest-bearing foreign currency deposit accounts (Yapı Kredi'den 10 bin dolar ve Euro altında vadeli mevduat açmama kararı için açıklama, 2020).

Despite all these attempts, the regression results point to a 5.9% rise in foreign currency-denominated deposits of large banks (see column 6 of Table 2). One particular reason for this outcome is the lack of trust in the Turkish Lira during the same period due to its high volatility (see footnote 5). On the other hand, domestic deposits displayed a 7% rise in the treatment group. This result is not surprising since deposits are the main source of financing for commercial banks in Turkey. The positive association between deposit growth and bank lending is documented by Guo and Stepanyan (2011) for 38 emerging economies. Alihodzic and Eksi (2018) provide evidence on the fact that loan growth is fueled by deposit growth for Turkey as well as selected Eastern European countries. In line with these findings, Abbasoglu *et al.* (2015) report an average deposit to asset ratio of 65% for Turkish commercial banks for the 2003–2013 period. Based on all this evidence, it is not surprising that any policy promoting credit growth also stimulates deposit growth in the Turkish banking system.

In Table 3, we present the results of the regression analysis for selected ratios. Column 1 shows the estimates of β_1 and β_2 for the domestic to foreign deposits ratio. Neither of these estimates are significant implying that, the policy did not alter the deposit composition of the partially treated and treated banks. For large banks, this result is due to a simultaneous rise in deposits of both denominations. Since medium-sized banks did not experience any change in their deposit growth compared to small banks during the treatment period, their deposit compositions did not change either.

The credit to security is another important ratio that reflects the asset composition preferences of banks as they tried to implement the new rule. The second column presents the results for this ratio. These results reveal that the asset ratio policy did not significantly change the credit to security ratio of large banks compared to small ones. However, medium banks that were partly exposed to the policy experienced a 36% lower credit to security ratio than small banks during 2020q2. This result is in line with the results obtained in Table 1, which suggest that government securities increased at a faster rate compared to loans among this group during their treatment period.

The estimates of the impact of the asset ratio policy on credit to deposit and security to deposit ratios are presented in the last two columns of Table 3. The banks in the treatment group showed no significant change in either of the ratios compared to the banks in the control group. This is because of a simultaneous rise in the credits and deposits during the policy implementation period. On the other hand, medium banks did not expand their credits but preferred to purchase more securities to comply with the rule. Hence, their credit to deposit ratio did not change, but their security to deposit ratio improved significantly by almost 6% compared to small banks in 2020q2.

Based on these results, we can argue that asset ratio policy has been fast and effective in stimulating credit growth in the economy. Previously Abbasoglu *et al.* (2020) estimated the impact of the average funding rate of CBRT on credit growth for the 2002–2015 period, during which monetary authorities were trying to curb the excessive credit growth using monetary and macro-prudential policies. Their results show that a one-percentage point rise in the

average funding rate decreases the growth rate of large bank loans by 0.8% points after one-quarter. In a similar setting, Alper *et al.* (2014) study the impact of a change in reserve requirement ratio on loan growth in Turkish banking system. They report that a one percentage point rise in the required reserve ratio generates a 4.9% points decline in the growth rate of consumer loans and less than half of that impact is observed for commercial loans with a one-month lag. Findings in Cavusoglu (2010), which report a 3- to 5-month lag in the pass through of policy rates to loan rates, confirm the lag in the transmission of monetary policy. Another important thing to note is the possible asymmetry in banks' reaction to changes in the policy. Binici *et al.* (2016) highlight this asymmetry in the pass-through of tight and loose monetary policy to loan rates in their analysis. They find that the loan rates respond more to a rise in the policy rate than they due to a decline. Hence, the effectiveness of expansionary monetary policies in stimulating credit growth might even be smaller than the ones reported in Abbasoglu *et al.* (2020) and Alper *et al.* (2014). Taking into account the lags and the mitigated impact of the conventional and unconventional tools that have been used in previous periods, the asset ratio policy turned out to be a very effective and acute tool that stimulated higher credit growth than the other possible alternatives. Moreover, the room for maneuver allowed by the policy tools at hand was limited because of the economic vulnerabilities Turkey was facing during that time. Inflation was hovering around chronically high levels of 11–12%, the domestic currency was highly volatile. These already existing fragilities in the economy were aggravated with the outbreak of the Covid-19 crisis and triggered a skyrocketing of the CDS premium of the country [11]. Within this context, further easing in monetary policy to stimulate credit growth could trigger capital outflows and put the country under systemic risk (Kara, 2021). When all these were taken into consideration, producing new and temporary solutions, like the asset ratio policy, emerged as the right approach.

Though the policy appeared as a convenient approach to assist the economy, it raised some red flags of elevating the risk exposure level of the banking sector. To explore whether these were valid concerns, we conducted an analysis of the effects of the policy on the risk exposure of the banking system. We estimate Equation (1), this time setting the independent variable to the log value of the allowances allocated by banks against expected credit risk. The results are presented in column 1 of Table 4. The estimate of β_1 parameter points to a positive but insignificant change in risk allowances in the treatment group. Medium banks, on the other hand, experienced a decline in their allowances during 2020q2 as they were partly exposed to the policy. This outcome is in line with the results presented in Table 2, where these banks increased their government securities while displaying no significant change in their credits.

Beginning in 2018q1, banks in Turkey adapted the Turkish Financial Reporting Standards (TFRS 9) to be in line with the International Financial Reporting Standards (IFRS 9). In the new system, the credit risk allowances are grouped under three categories depending on the duration of the delay in the repayment of the loans. The last category consists of loans whose repayments were postponed for one year or more [12] To fully account for the credit risk that may arise due to the policy we extended the treatment period until 2021q2 in this analysis. In addition, we regress the logged value of allowances on an interaction of the five-quarter dummies with the large bank dummy as in Equation (2).

$$\begin{aligned}\ln allw_{iyq} = {} & \beta_o + \beta_1 large_i * I_{2020q2} + \beta_2 medium_i * I_{2020q2} + \beta_3 large_i * I_{2020q3} \\ & + \beta_4 medium_i * I_{2020q3} + \beta_5 large_i * I_{2020q4} + \beta_6 medium_i * I_{2020q4} + \beta_7 large_i * I_{2021q1} \\ & + \beta_8 medium_i * I_{2021q1} + \beta_9 large_i * I_{2021q2} + \beta_{10} medium_i * I_{2021q2} + \eta_i + u_y + \nu_q \\ & + \varepsilon_{iyq}\end{aligned} \tag{Eq. 2}$$

The results of Equation (2) are presented in column 2 of Table 4. The estimate of β_1 points to a 7% rise in the credit risk allowances of large banks vis-à-vis small ones during the first quarter of the enactment of the policy. This effect disappears in the following quarters. Even one year after the policy was put into effect, we do not find any significant change in the allowances allocated against credit risk. Our explanation for this pattern is that on the impact of the shock, large banks were reckless about the risk they are bearing since they had to urgently fulfill the asset ratio requirement to avoid the regulatory fine. Along the way, they were able to reach out to more credit-worthy customers [13].

The analysis by Baziki and Capacioglu (2021) on similar policies approves the prudent behavior of Turkish commercial banks that we observe under the asset ratio policy. The policies they examine limit the commercial real estate loan-to-value ratio (LTV) and expansion of the credit guarantee scheme. The authors show in the paper that after a tightening LTV cap policy, banks prefer to extend loans above the LTV cap to firms that have long-established relationships with the bank and that have a better credit history. When deciding the firms that will make use of the credit guarantee scheme, banks adhere to the same criteria, as well. The earlier literature that examines credit guarantee schemes in other countries show that banks prefer riskier firms under this scheme. Therefore, Turkish banks differ from the previous implementation of the policy in that they maintain their prudent stance even when making loans that do not expose them to risk.

Our results regarding the impact of the new policy on banks' risk exposure confirms this behavior and shows that even facing such a stringent policy measure, banks used their previously built customer relations and did not let this policy build up systemic risk in the financial sector of the country. In that sense, Turkish banks fit into the category of sound financial institutions that are not affected by the implementation of countercyclical prudential measures, as argued by Demirguc-Kunt *et al.* (2020).

6. Conclusion

The Covid-19 pandemic triggered a global economic recession, which required all countries to "act fast and do whatever it takes" (Baldwin and Weder di Mauro, 2020). Turkey was no exception to this situation. Along with some fiscal and monetary measures, the country enacted a new measure called the "asset ratio" rule to mitigate the impact of the crisis on the economy. This rule required banks with deposits above a threshold to maintain the ratio of the sum of their loans, securities and foreign exchange swap transactions to their deposits are 100% for commercial banks and 80% for participation banks.

This paper evaluated the impact of this new rule on loans, government securities, foreign exchange swap transactions, deposit composition and risk exposure of banks in Turkey. We use a difference-in-difference regression exploiting the variation in the growth rate of loans between large banks that were exposed to the policy and small ones that were exempt. Our findings suggest that the asset ratio policy generated a significant rise in loans and government securities in the Turkish banking system. The policy generated a significant simultaneous rise in deposits of the treatment group, mainly because banks in Turkey are dependent on deposits in financing their loans.

Objections raised against the asset ratio rule mainly centered on the argument that the new rule had the potential to force banks into extending loans to risky customers and could result in an increase in the risk exposure of the banking system. Our results point to a slight increase in the credit risk allowances among the treated group of banks during the first quarter of the asset ratio policy, which vanished in the following quarters.

The rise in the growth rate of loans is not a surprising outcome. However, it is interesting to see that banks' holdings of government securities raised nearly as much as their loans pointing out the prudent behavior of banks in Turkey. This behavior partly explains how a

policy that forces financial institutions to increase their loan supply did not create additional risk in this sector according to our results. Another explanation is that, as Baziki and Capacioglu (2021) showed for different policies, Turkish banks prefer to give loans to creditworthy firms that have long-established relations with them. Considering all these, we can conclude that the policy under scrutiny succeeded to ensure credit growth without harming financial stability.

A comparison of the impacts of the asset ratio rule on loan growth with expansionary monetary policy tools shows that the new policy acts faster since it does not involve any lags in the transmission of its effects. Moreover, it is bolder since it generates a higher increase in loan growth. Another issue about expansionary monetary policy, especially of the unconventional type is that it takes a longer time to reverse its effects. Advanced countries where the monetary policy has reached a natural limit due to the ZLB had to resort to these unconventional tools both in the aftermath of the Covid-19 and in the global financial crisis. The obstacles to exit out of and undo the effects of these unconventional monetary policies have been mentioned earlier in the literature [14]. Based on all these arguments, our results point out the benefits of including a target-oriented policy such as the asset ratio rule in the toolbox of policymakers to be used when necessary.

Although we infer from our analysis that asset ratio policy is an effective and acute tool to increase credit growth in both developing and developed countries with limited policy space, our results should be taken with a pinch of salt. It is essential that we underline the importance of a robust, prudent and well-capitalized banking system in the economy and that the country should have enough fiscal space. Otherwise, the policy may have an unintended consequence of increasing systemic risk.

The main objective of the asset ratio policy was to help SMEs that were in urgent need of liquidity at the beginning of the crisis. The bank balance sheet data used in this paper does not contain information about the borrowers of the loans extended during the implementation of the policy. Analysis of this dimension using matched bank-firm level data will better demonstrate the success of the policy in achieving this goal. We address this as the main limitation of our paper and leave that analysis for future research.

Notes

1. See www.tcmb.gov.tr/wps/wcm/connect/EN/TCMB+EN/Main+Menu/Announcements/Coronavirus for further detail.
2. The original formula of asset ratio was first announced on April 18, 2020, with Decision number 9000. The coefficient of FX deposits was increased to 1.75 on May 29, 2020, with Decision number 9042.
3. Decision no. 9000
4. Decision no. 9003
5. Decision no. 9042. A list of data sources and banks included in the sample are provided in Appendix.
6. Decision no. 9125, 9170, 9271.
7. For our analysis on the banking sector's risk exposure, we extend the post-treatment period to 2021q2.
8. Large banks have 25 billion TL and above worth of deposits. Medium banks own deposits less than 25 billion but more than 5 billion TL and small banks are those having less than 5 billion TL total deposits on 2020q1.
9. See Angrist and Pischke (2008) pp. 169–184 for a more detailed discussion of the methodology.
10. Domestic currency depreciated by 15% vis-à-vis the US dollar during the third quarter of 2020 reaching a record-high on the first week of November (BloombergHT, 2020).

11. The value of the 5 years sovereign CDS of the country started rising on February, 2020 and reached a record high value of 643 on May, 2020. See http://www.worldgovernmentbonds.com/cds-historical-data/turkey/5-years/for the CDS spreads of the previous 5 years.
12. Us (2020) shows that under the new standards the definition of risky loans and the allowances allocated against expected credit losses changed leading to an increase in both.
13. Another reason may be the reduction in the asset ratios by 5 percentage points. The lower ratios were effective as of September 2020 hence affected the bank performance in 2020q3.
14. ECB (2013) and Cook and Yetman (2012) explain in detail the possible risks associated with policies that expand the balance sheets of central banks.

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Appendix

List of Abbreviations

BRSA: Banking Regulation and Supervision Agency

CBRT: Central Bank of the Republic of Turkey

TL: Turkish Lira

FX: Foreign Currency

TFRS 9: Turkish Financial Reporting Standards

IFRS 9: International Financial Regulation Standards

Data Sources

Balance sheet and off-balance sheet data on deposit banks are retrieved from The Banks Association of Turkey. Their website is http://verisistemi.tbb.org.tr/. Access date: September 1, 2021.

For participation banks, the data source is Participation Banks Association of Turkey. Their website is https://tkbb.org.tr/veri/istatistikler. Access date: September 1, 2021.

List of Banks Included in the Sample

Small Banks

Arap Türk Bankası

Bank Mellat

Bank of China Turkey

Deutsche Bank

Habib Bank Limited

JPMorgan Chase Bank N.A.

MUFG Bank Turkey

Rabobank

Société Générale (SA)

Turkish Bank

Turkland Bank

Medium Banks

Alternatifbank

Anadolubank

Burgan Bank
Citibank
Fibabanka
ICBC Bank
Intesa Sanpaolo S.p.A.
Odea Bank
Vakif Katilim
Şekerbank T.

Large Banks

Akbank
Albaraka
Denizbank
HSBC Bank
ING Bank
Kuveyt Turk
QNB Finansbank
Turkiye Finans
Türk Ekonomi Bankası
T.C. Ziraat Bankası
Türkiye Garanti Bankası
Türkiye Halk Bankası
Türkiye Vakıflar Bankası
Türkiye İş Bankası
Yapi ve Kredi Bankasi
Ziraat Katilim

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