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Abstract

This paper follows a holistic approach to analyze the concept of liquidity creation in the case of the Turkish banking industry. In the first part of our analysis, we implement a revised version of the novel method suggested by Berger and Bouwman (2009) to construct liquidity creation proxies with varying scope and content for a sample of 24 banks over the period 2003-2023. The second part of the paper attempts to test frequently cited hypotheses from the banking literature on an emerging market case. Our estimations show that capital adequacy, ownership structure and the level of competition stand out as paramount predictors of bank liquidity creation. Specifically, banks with stronger capitalization experience a lower level of liquidity creation, whereas state-owned banks tend to create more liquidity relative to non-state-owned peers. It is also found that improving competition among banks might boost the liquidity creation process. Moreover, our findings are informative concerning the potential implications of liquidity creation. We find that increasing liquidity creation co-exists with higher individual bank risk. In the last stage, we adopt a regional analysis to assess the effect of liquidity creation on economic growth. By using the branch network of sample banks as the instrument, we transform the bank-level data into a spatial representation of liquidity creation for 81 provinces of Türkiye. Our estimations imply that liquidity creation is positively related to provincial economic growth.

Keywords: Liquidity Creation, Bank Capital, Competition, Ownership Structure, Bank Risk, Economic Growth

JEL Codes: G21, G28, C33

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Non-Technical Summary

The key functions assumed by conventional financial intermediaries (banks) constitute loan extension and deposit collection. While these core services mainly determine the amount of liquidity provided for the rest of the economy, the liquidity creation process is likely to be affected by a wider set of bank activities monitored in the balance sheet formation.

In this paper, we use the widely cited method of Berger and Bouwman (2009) to create novel bank-level indicators for liquidity creation, a process that is also vital for macroeconomic and financial stability. By utilizing high-frequency regulatory filings of Turkish banks for the period 2003 to 2023 and by revising the original method in light of the specific characteristics of the Turkish banking industry, we find that the liquidity creation process has been enhanced in recent decades, reflecting long-term financial deepening. However, those indicators have followed a volatile pattern in recent years due to external shocks and regulatory interventions, which points out the impaired ability of banks to support the real economy.

After introducing the adapted version of the Berger and Bouwman (2009) method and constructing the proxies, we also empirically test the potential predictors and consequences of the liquidity creation for the Turkish financial system via panel regressions. In this context, we show that excess capital buffers are negatively related to bank liquidity creation. On the other hand, improved competition and direct state ownership are associated with stronger liquidity creation. As a prime implication, we find that excessive liquidity creation is tied to amplified bank riskiness. Moving our focus from bank-level to province-level analysis (by using the branch network of banks as the instrument to create spatial liquidity creation proxies), we also show that higher liquidity creation promotes regional economic growth.

I. Introduction

Banks help the smooth functioning of the real economy through liquidity creation. Theoretical assertions suggest that banks are capable of creating liquidity for the rest of the economy by financing comparably illiquid assets (such as commercial & industrial loans) with relatively liquid liabilities (such as demand deposits) (Bryant, 1980; Diamond and Dybvig, 1983; Diamond, 1984; Boyd and Prescott, 1986). In this context, banks that accumulate the aforementioned balance sheet items inevitably provide liquidity to the public. On the other hand, banks investing in liquid assets and financing these transactions with either illiquid liabilities or equity items essentially destroy liquidity provided to the economy. Off-balance sheet activities of banks including loan commitments, contingent claims and derivative transactions may also adjust the extent of liquidity creation (Boot et al., 1993; Kashyap et al., 2002). Hence, the modern financial intermediation theory argues that, together with risk transformation role, the liquidity creation function is the central pillar of banks' existence and a useful indicator of bank output (Pana, 2023).

Liquidity creation is also deemed to be a catalyst for how bank activities spur financial development and facilitate economic activity. The fact that banks create liquidity by extending illiquid assets (and loan commitments) while allowing businesses to access funds and undertake investments (without having to resort to capital markets) makes it a prime factor of efficient capital allocation and economic growth. Similarly, banks' ability to create liquidity by issuing transaction deposits, which allows businesses and households to access payment services, also assists smooth macroeconomic functioning by facilitation and storage of buying and selling activities. Nevertheless, the liquidity creation process has also required supervisory and regulatory attention as it inherently makes banks vulnerable to liquidity risk and bank runs, ultimately causing financial stability concerns (Berger and Bouwman, 2017; Kladakis et al., 2022).

Despite the theoretical attention to the subject, the banking literature has neglected the empirical testing of how liquidity creation interacts with other factors due to the lack of proper empirical measures. Earlier attempts to design empirical proxies of liquidity creation, such as Deep and Schaefer (2004), solely focus on the difference between liquid liabilities and assets to follow the liquidity of the bank itself, otherwise known as the LT gap. In this regard, the seminal work of Berger and Bouwman (2009) was a turning point in terms of devising an empirical measure to describe how much liquidity a bank provides to the public, instead of how liquid a bank is. Their stepwise methodology entails

the classification of individual bank balance sheet items into groups with varying degrees of liquidity levels, assignment of weights to those items and finally the weighted aggregation procedure to synthesize easily interpretable bank-level liquidity creation indicators. Since then, their work has inspired many empirical investigations of the elements and implications of bank liquidity creation (Jiang et al., 2016; Berger and Bouwman, 2017; Casu et al., 2019; Boubakri et al., 2023). Despite this burgeoning literature, most empirical works have concentrated on developed markets, with fewer applications to an emerging market setting (Fungáčová et al., 2021; Raz et al., 2023).

In this paper, we apply the method of Berger and Bouwman (2009) to formulate liquidity creation indicators for the Turkish banking industry, which provides an interesting case given the dominance of conventional banks in financial intermediation activities and the strong dependence of economic agents on banks for access to finance. To this end, we utilize novel bank-level datasets available in the Central Bank of the Republic of Türkiye (CBRT) comprising regulatory filings. We calibrate the original procedure of Berger and Bouwman (2009) to generate unique high frequency and updated liquidity creation indicators for Turkish banks spanning a sample period from January 2003 to December 2023. Apart from examining the historical evolution of these indicators, we also perform a set of panel regressions to investigate the widely known drivers and consequences of bank liquidity creation by drawing on the case of Türkiye. In particular, we test whether capital adequacy, competition and ownership structures drive liquidity creation. In the last stage of our paper, we assess how bank liquidity creation affects bank solvency and economic growth.

By way of preview, we find that liquidity creation measures for the Turkish banking sector increase over time, which shows the financial deepening of the banking sector and the expansion of the variety of intermediation activities. Besides, state-owned banks on average create more liquidity compared to private banks, except for the period prior to the Global Financial Crises (GFC). There is not much difference between large and small banks in terms of the amount of liquidity provided to the economy, but the liquidity creation measure for the larger banks shows a more stable trajectory. As mentioned before, in the following step, we test popular conjunctures relevant to liquidity creation from the banking literature on the particular case of Türkiye. First, we document that bank-level capital adequacy is an important factor in liquidity creation in Türkiye. Larger capital buffers in excess of the regulatory threshold co-exist with lower levels of liquidity creation as a proportion of total assets. Additionally, our estimations

demonstrate that sector-wide competitive conditions in the Turkish banking industry are among the vital elements shaping the liquidity creation. In specific, improving competition is related to higher volume of liquidity creation. We also argue that the ownership structure is an essential governance characteristic influencing the course of liquidity creation, which is evident in the case of the ability of Turkish state-owned banks to generate more liquidity relative to private and foreign peers. The last section deciphers the potential consequences of liquidity creation. The bank-level regressions imply that higher degrees of liquidity creation dampen bank solvency for the total sample, while this effect is reversed when only the largest banks are considered, resulting in enhancements of bank solvency. Moving from bank-level to provincial (NUTS-3 level) liquidity creation measures (derived by using the spatial presence of sample banks as the instrument to allocate total liquidity into geographical units of Türkiye), we show that the provinces with abundant liquidity creation activities of financial intermediaries are more likely to enjoy superior economic growth.

The contribution of this paper to the existing literature is twofold. First, following the seminal work of Berger and Bouwman (2009), a thriving strand of the literature has utilized those empirical measures to test the interactions between liquidity creation and several factors including: financial crises (Berger and Bouwman, 2017); economic output (Berger and Sedunov, 2017); culture (Boubakri et al., 2023); bank capitalization (Casu, 2019); bank governance (Díaz and Huang, 2017); competition (Jiang et al., 2019); and regulation (Kladakis et al., 2022) among others. However, the majority of these studies concentrate on the banking systems of the US or other developed economies. A few papers aim to fill this gap by synthesizing and analyzing liquidity creation indicators for developing economies including Russia (Fidrmuc et al., 2015; Fungáčová et al., 2021), Vietnam (Dang, 2020), Czechia (Horváth et al., 2014) and North African and Middle Eastern countries (Raz et al., 2023). We add to this line of work by using the case of a large emerging market with bank-dependent financial architecture to discuss the implications of banks' liquidity creation function.

Second, we aim to enhance the understanding of liquidity creation in the case of Türkiye. Akın and Özsoy (2019) also benefit from the Berger and Bouwman (2009) framework to examine liquidity creation in the Turkish banking system, albeit through an aggregated lens. To best of our knowledge, Akın and Özsoy (2022) is the only prior work applying the Berger and Bouwman (2009) framework to derive bank-level liquidity creation proxies for Türkiye. Our paper differs from Akın and Özsoy (2022) on several

fronts. With the help of confidential regulatory filings data, we are able to create bank-level liquidity creation measures at a higher (monthly) frequency and with alternative coverage (by differentiating certain bank assets and liabilities based on type and maturity). Furthermore, we are able to construct the liquidity creation measures with recent data (up to the end of 2023), allowing us to make inferences about liquidity creation in the Turkish banking system against a set of contemporary macro-financial disturbances. Last but not least, Akin and Özsoy (2022) mainly examine how state-owned banks' liquidity creation tendencies evolve around election times, whereas our paper has a rather holistic approach and investigates the potential determinants and consequences of liquidity creation in order to test the validity of common hypotheses in the banking literature in the context of Türkiye.

The rest of the paper is as follows. Section II provides details about the dataset, while Section III outlines the methodology of creating liquidity creation indicators. Section IV undertakes the empirical analyses to comment on the movements of the generated liquidity creation indicators and to test the potential determinants and consequences of liquidity creation (the ones that are widely cited in the literature) for the specific case of Türkiye. Section V concludes the paper.

II. Data

The main data sources used in this study are the balance sheet and income statements of Turkish banks retrieved via confidential regulatory filings available in the Central Bank of the Republic of Türkiye (CBRT), which demonstrate the detailed evolvement of the bank-level financial outlook at monthly frequency. Our sample period straddles the interval from January 2003 to December 2023. To form the list of sample banks, we exclude participation, development and investment banks as such entities have entirely different business orientation, balance sheet structure, funding sources and asset allocation compared to traditional commercial banks whose liquidity creation behavior forms the basis of this study. After considering the data availability for detailed financial statements, we delete banks with zero loan and deposit balances in any given period. We further omit those banks without balanced panel structure in order to avoid possible fluctuations due to the opening or closing of a bank. Since missing observations for those opening or closing banks are not random, it could cause biased estimates. Our ultimate sample consists of 24 individual banks (with 6,048 bank-month observations) and, as of 2023, the sum of their shares in total banking assets is quite high (94%), displaying the

high level of representativeness of our sample for the entire industry.¹ Sample banks are also diverse in terms of ownership structure in the sense that our empirical analyses consider state, private and foreign-owned commercial banks. For an alternative measure, we further incorporate transaction-level data for the TL swaps of the banks with the CBRT from another confidential dataset provided by the Banking Regulation and Supervision Agency (BRSA), since swap transactions become an alternative funding source for CBRT affecting the liquidity position of the Turkish banking sector directly. Moreover, we employ other data sources in the extended estimations to evaluate the relationship between liquidity creation and provincial economic growth. We make use of the historical information about bank branch distribution from the Banks Association of Türkiye statistical reports and province-level information concerning GDP growth from the Turkish Statistical Institute (TurkStat). Variable definitions, data sources and summary statistics are given in Table 1.

[Insert Table 1 Here]

III. Methodology

Our liquidity creation measures follow the steps in the “cat-non-fat” framework of Berger and Bouwman (2009). We first classify balance sheet items as liquid, semi-liquid or illiquid based on the ease, cost and time of liquidation for both assets and liabilities, as shown in Table 2. We then assign corresponding weights to each category. Following the theoretical aspects of the liquidity creation process, banks are assumed to create liquidity when they finance illiquid assets with liquid liabilities. Therefore, positive weights are attributed to illiquid assets and liquid liabilities. Conversely, liquidity is destroyed when liquid assets are financed by illiquid liabilities or equity, so negative weights are assigned to liquid assets, illiquid liabilities and equity. The weights are assigned as $\frac{1}{2}$ and $-\frac{1}{2}$ in order to facilitate the creation of 1 TL of liquidity for the public with the transformation of 1 TL of deposits into 1 TL of illiquid loans. Lastly, semi-liquid items are given the weight of 0, as they are considered to be neutral in terms of liquidity creation. After constructing the definitions and the weights, we aggregate the multiplied measures of the balance sheet

¹ The sample banks are as follows: Ziraat Bank, Halkbank, Vakıfbank, TEB, Akbank, Şekerbank, Garanti Bank, İş Bank, Yapı Kredi Bank, Arap Türk Bank, Citibank, Bank Mellat, Turkishbank, Habib Bank, ING Bank, Adabank, Turkland Bank, ICBC Turkey, QNB Finansbank, HSBC, Alternatifbank, Burganbank, Denizbank and Anadolubank.

items and divide by banks' total assets in order to normalize the cross-sectional measures of the liquidity creation as follows:²

$$LC_{it} = \left[\begin{array}{l} \left(\frac{1}{2}\right) * (illiquid\ assets + liquid\ liabilities)_{it} \\ + 0 * (semi - liquid\ assets + semi - liquid\ liabilities)_{it} \\ + \left(-\frac{1}{2}\right) * (liquid\ assets + illiquid\ liabilities + equity)_{it} \end{array} \right] / total\ assets_{it} \quad (1)$$

The way we calibrate Berger and Bouwman's (2009) approach in classifying liquid, semi-liquid and illiquid assets and liabilities for the Turkish banks ultimately yields 10 different definitions, leading to several versions of the indicators (ranging from $LC1$ to $LC10$). In constructing these different measures, the maturity structure is still taken into account, but at the same time, we stick to the category-based definition of Berger and Bouwman (2009), where shorter maturity items are considered as more liquid than longer maturity items, and also securitized loans such as mortgages are defined as more liquid than corporate loans.

In this context, we briefly discuss how one of these measures ($LC5$) differs fundamentally from the original specification in order to better describe the novelty of our approach. In Table 2, we present the categorization of the $LC5$ measure in which our liquidity definition of deposits and loans differs from Berger and Bouwman (2009), where the original paper considers all transaction and savings deposits as liquid. However, most of the deposits in the Turkish banking sector have a maturity of three months or less, so we treat "demand and time deposits up to three months" as liquid.

Regarding another issue faced in the calibration process, Berger and Bouwman (2009) consider residential mortgages and consumer loans as semi-liquid due to the securitization of real estate and the shorter maturity of consumer loans. By contrast, Berger et al. (2019) categorize residential mortgages and consumer loans as illiquid assets for developing and low-income countries due to the constraints on the ease and cost of converting these loans into liquid funds. Fortunately, our regulatory data allows us to disaggregate loans into four types: commercial, mortgage, consumer, and credit cards. Using this formulation, we consider all loans except mortgages as illiquid for $LC5$. In

² We further classify the off-balance sheet activities accordingly and create alternative measures, however our baseline measures only include on-balance sheet activities due to the volatile large amount of derivative transactions for some banks done for hedging activities. Alternatively, we evaluate the TL swap transactions as liquid assets and liquid liabilities since swap transactions become an alternative funding source to open market operations for CBRT, especially after 2019. Our inferences are robust to alternative measures including swap transactions.

addition, the non-performing loans are assumed to have the same share in the loan types in the balance sheet and they are defined in accordance with the loan types. Therefore, the average maturity of loan types and deposits for the Turkish banking sector is included in our basic "cat-non-fat" measures.

In addition to loan types and the deposit maturities, our liquidity definition for some balance sheet items also diverges from the existing literature due to unique aspects of the Turkish banking sector's balance sheet structure. For instance, we consider receivables from the CBRT as semi-liquid since TL required reserves of the banks are reported in this item and they are not as liquid as other items such as the receivables from reverse repo or the money market. Besides, securities are essentially classified as "available-for-sale" and "held-to-maturity", while their maturity structure also varies due to the nature of the transactions. For the liabilities side, payables to the CBRT, the money market and banks are engaged as liquid due to shorter maturities of these balance sheet items in contrast to the US banking sector. Other than the balance sheet activities listed above, our procedure for categorizing balance sheet items is in line with the Berger and Bouwman (2009) method.

Alternatively, we have incorporated swap transactions of banks with the CBRT into our cat-non-fat measure *LC5*, similar to liquid assets and liquid liabilities, to capture the effect of swap funding for the recent years. The time series for *LC5* including and excluding swap data is presented in Figure A1 of the Appendix. Other combinations for both assets and liability sides are presented in Figure 1 (in the form of the series ranging from *LC1* to *LC10*) and differences among them are given in Table 1.

[Insert Table 2 Here]

IV. Results

In this section, we present our empirical findings. The first part of the section is devoted to discussing our liquidity creation indicators descriptively and how the dynamic course of those indicators shifts depending on certain bank characteristics. The next part involves testing the potential determinants of liquidity creation in the case of the Turkish banking system. The last part concludes the section by analyzing the consequences of liquidity creation.

IV.I. Highlights of Bank Liquidity Creation

The weighted average of liquidity creation measures for the Turkish banking sector from *LC1* to *LC10* increases over time, which is indicative of the improved financial deepening in the banking sector as well as the expanding range of intermediation activities (Figure 1). One of the obstacles to using an emerging market balance sheet is the currency fluctuations. In the last quarter of 2008, there was a visible upward movement in liquidity creation indicators arising from the FX positions in balance sheets. In that period, the FX deposits and FX credits in the balance sheet had a larger share and an increase in the exchange rate caused an increase in the liquidity measures. The effects of financial shocks and regulations, such as exchange rate movements, the slowdown in economic activities during the pandemic period and the increased deposit growth with the transition to FX-protected deposits stand out as the factors affecting liquidity creation over time. Increasing credit expansion throughout 2022 and in the first half of the 2023 as well as the rapid deposit growth increased liquidity created by banks for the rest of the economy. With the introduction of the tight monetary policy and slowdown of the credit growth, the liquidity creation measure started to decrease recently.

The distinction between state-owned and private banks for the sample period is further illustrated in Figure 2. On average, state-owned banks appear to create more liquidity than private banks. The difference between the liquidity creation measures of state-owned and private banks prior to the GFC raises the relationship between liquidity creation and bank risk, which will be assessed in the following sections. Nevertheless, there was a structural shift in the movements of these two series starting from the second half of 2018, when exchange rate volatility was high. In detail, we observe that the illiquid liabilities and liquid assets of private banks increase more than the other balance sheet items. This result shows the preference of private banks to remain liquid on their asset side (along with a reluctance to increase credit growth), which destroys liquidity creation for the rest of the economy. On the other hand, the opposite is true for state-owned banks.

Figure 3 illustrates that the larger banks create a similar level of liquidity to smaller ones, and this trend applies to the entire banking sector. However, the liquidity creation of larger banks is smoother than that of smaller banks, which could be attributed to their larger size and better balance sheet management. The heterogeneity and persistence of liquidity creation owing to bank size and managerial efficiency is evident in the prior literature. Pham et al. (2021) find that the sensitivity of liquidity creation to financial conditions and monetary policy stance is rather muted for banks with larger

operational size. Díaz and Huang (2017) document that banks with better internal governance characteristics tend to create more robust liquidity amidst financial shocks and crises. Andreou et al. (2015) render support to this idea by showing that banks run by managers with higher ability are capable of creating more liquidity. Berger and Bouwman (2009) report that, unlike smaller banks, capital formation supports the liquidity creation particularly for larger banks. Delis and Staikouras (2011) argue that the “one-size-fits-all” approach is not enough when designing a prudential framework for bank supervision for ensuring financial soundness, which is a key concept pertaining to the liquidity creation ability of commercial banks. Related to regulatory aspects, Distinguin et al. (2013) claim that large banks are able to maintain a more stable course of liquidity creation thanks to easier access to explicit and implicit financial safety nets.

[Insert Figures 1 to 3 Here]

IV.II. Predictors of Bank Liquidity Creation

Capital Adequacy

In terms of the potential predictors of bank liquidity creation, we first consider the capital position. Given that bank vulnerabilities experienced during the GFC had been partly caused by the insufficient solvency levels, the post-crisis regulatory approach has paid close attention to building up necessary capital buffers for banks (including proposed capital rules under the Basel III framework). In other words, the level of equity capital has become a forefront balance sheet characteristic for bank supervisors and regulators. Banks with significantly lower levels of capital are likely to contribute to systemic risk in a more frequent way (Laeven et al., 2016). On top of regulatory attention, banks have unusual capital structure and high leverage (relative to non-financial companies), which might equip them with a unique function in creating liquidity for the rest of the economy (Macey and O’Hara, 2016).

The theoretical foundations behind the relationship between bank capital and liquidity creation are dominated by two opposing views. On the one hand, the “risk absorption” hypothesis predicts that higher bank capitalization is related to abundant liquidity creation (Berger and Bouwman, 2009). Emphasizing the risk transformation ability of banks, this argument posits that the liquidity creation process inevitably makes banks themselves less liquid. Hence, it increases the severity of bank losses, which potentially occur when banks have to dispose of illiquid assets (or relinquish new lending opportunities), in order to satisfy liquidity demands of customers in the short-term (Allen

and Santomero, 1997; Allen and Gale, 2004; Repullo, 2004). The risk absorption view claims that higher capital enhances banks' ability to absorb such risks, which results in the creation of more liquidity.

On the other hand, the “financial fragility/crowding out” hypothesis predicts that higher bank capitalization hampers bank liquidity creation (Diamond and Rajan, 2000, 2001). This argument follows the idea that a fragile bank position encourages banks to commit more resources to monitor borrowers and counterparties while extending loans, consequently supporting the liquidity creation process. Collecting deposits and extending loans creates an informational advantage for banks and an agency problem for depositors in which banks are likely to extract rents at the expense of depositors (Berger and Bouwman, 2009). To limit such an agency conflict, banks are inclined to show their commitments to depositors by sustaining a fragile funding structure characterized by a high share of liquid deposits and a higher likelihood of losses in case of the exploitation of depositors. Therefore, a fragile capital structure helps alleviate the aforementioned agency problem and also helps continued deposit collection and lending activities, eventually supporting the liquidity creation process. Conversely, high capital limits banks' ability to have a fragile financial position and makes it difficult for banks to engage in monitoring and creating additional liquidity (Horváth et al., 2014; Fungáčová et al., 2017; Díaz and Huang, 2017). Furthermore, high capital may also hurt liquidity creation by crowding-out core deposits, which constitute an important part of liquidity provisioning (Gorton and Winton, 2017). The existing literature provides empirical evidence supporting the validity of both hypotheses. Some studies find a negative relationship between capital and liquidity creation, as suggested by the financial fragility/crowding out view (Berger and Bouwman, 2009; Tran et al., 2016), whereas others document a positive correlation, as suggested by the risk absorption hypothesis (Fungáčová et al., 2017; Casu et al., 2019)

To evaluate how bank capital is attached to liquidity creation in the Turkish case, we adopt the following empirical model:

$$LC_{it} = \beta Capital\ Adequacy_{it-1} + \theta X_{it-1} + \delta_i + \gamma_t + \varepsilon_{it} \quad (2)$$

where LC denotes the variants of preferred “cat-non-fat” liquidity creation indicators, ranging from $LC1$ to $LC10$ (all normalized by gross total assets), as explained previously in the Methodology section. The main variable of interest is *Capital Adequacy* defined as the ratio of capital to total assets in excess of the regulatory threshold of 8%. We also control for time-varying bank features (X) including the natural logarithm of total

assets (*Bank Size*), net income divided by total assets (*ROA*), non-performing loans to total loans (*NPL*), provisions to total loans (*LLP*), non-interest income divided by total income (*Diversification*) and non-interest expenses divided by total income (*Efficiency*). The model in Equation (2) is saturated with bank (δ_i) and time (year-by-month) (γ_t) fixed effects. Lastly, ε_{it} stands for the residual term.

Estimation results are presented in Table 3 in an iterative form. For example, columns (1), (2) and (3) take *LC1* as the liquidity creation proxy. Column (1) uses the baseline specification with bank and time fixed effects, whereas column (2) adds the bank controls. Column (3) also implements the saturated model, but instead of full coverage of sample banks, only considers largest banks (including 13 banks with largest asset sizes). Then, we follow the same sequential estimation approach for the alternative liquidity creation indicators such as *LC2* in columns (4) to (6), *LC3* in columns (7) to (9) and so on, up to the last liquidity creation indicator *LC10* in columns (28) to (30). Regardless of the specification, the findings suggest that higher bank capital results in lower liquidity creation in a statistically significant way. We reach a similar conclusion when the definition of liquidity creation indicator is varied. In turn, this is in line with the financial fragility/crowding out hypothesis, rather than rendering support to the risk absorption hypothesis for the Turkish banking system.

[Insert Table 3 Here]

Competition

The second factor we consider is competitive conditions, which are likely to shape liquidity creation through amount, availability and types of loan extension as well as other banking activities (Berger and Bouwman, 2009). The existing literature describes contrasting views about the effect of competition on bank liquidity creation.

On the one hand, competition is expected to boost liquidity creation. Enhanced competition (or lower market power) might direct banks to offer more attractive pricing to customers (borrowers and depositors), resulting in stronger trends in lending and liquidity creation (Bain, 1959; Cetorelli and Strahan, 2006). Competition is also likely to support financial innovation and efficiency with positive externalities on liquidity creation given that the activities supporting liquidity creation are actually key areas to pursue innovation in the banking (Laeven et al., 2015). Rising competition also induces more transparency by alleviating bank opacity (Jiang et al., 2016). In turn, this persuades bank management to allocate more effort and resources in screening and monitoring, which may

be transformed into higher level of liquidity creation. Low competition also coincides with high charter values deterring bank managers from undertaking risky activities, which lead to a lower level of generated liquidity (Keeley, 1990).

On the other hand, a series of arguments imply that competition is expected to interrupt bank liquidity creation. A strand of banking literature accepts that stronger market power (or declining competition) facilitates banks' relationship lending (Petersen and Rajan, 1995). Thus, increasing market power of banks can indirectly boost liquidity creation while the downward impact on liquidity creation can be observed when improved competition erodes the market power and consequently relationship lending. Moreover, bank competition could put downward pressure on profit margins and buffers (Jayaratne and Strahan, 1998). This is likely to incentivize bank managers to cut back loan and deposit activities in order to be protected against bank runs and to contain excessive bank risk, which ultimately lowers liquidity creation (Horváth et al., 2016). Jiang et al. (2019) find that increasing competition due to the abolition of geographical restrictions on banking reduced liquidity creation of US banks.

To test the predictive power of competition on bank liquidity creation, we utilize the following model specification:

$$LC_{it} = \beta Competition_{t-1} + \theta X_{it-1} + \delta_i + \varepsilon_{it} \quad (3)$$

where LC represents the previously described proxies classifying the level of liquidity created by bank i at time t , normalized by gross total assets. The main independent variable is *Competition*, which is the inverse of HHI measure derived from the market shares of individual banks (calculated depending on bank assets in relation to total banking industry assets at a given timepoint t). Therefore, increasing values of *Competition* correspond to a higher degree of competition, whereas decreasing values are related to a lower degree of competition. The model provided in Equation (3) is estimated together with the same set of bank-controls (X) and bank (δ_i) fixed effects, but we do not include time fixed effects given that the main variable of interest (*Competition*) is bank-invariant.

The entire set of findings are provided in Table 4. In line with our approach in the last stage of analysis, we perform our estimations in an iterative way. We first consider the baseline model predicting liquidity creation indicator $LC1$ without bank controls (but with feasible fixed effects) in column (1), and then switch our focus to the model with bank-level covariates in column (2), whilst column (3) draws conclusions for the limited sample

coverage with only largest banks. The remaining panels of the table repeat the same estimations for other liquidity creation measures $LC = LC2, \dots, LC10$. To sum up, our findings suggest that improving sector-level competition promotes liquidity creation as evident in the positive and statistically significant coefficient attached to the *Competition* variable.

[Insert Table 4 Here]

Ownership Structure

Another dimension explaining the extent of variation in liquidity creation is the bank ownership structure. Although there is a well-developed literature on the role of ownership composition (specifically the role of state ownership) in maintaining countercyclical lending behavior, little attention has been given to how ownership structure influences the provision of liquidity (Ferri et al., 2014; Bertay et al., 2015). Yeddou and Pourroy (2020) document that banks with concentrated ownership structure (measured by the percentage of stock held by controlling shareholders) are responsible for more liquidity creation compared to banks with dispersed ownership composition. Davydov et al. (2018) demonstrate minimal differences among state, private and foreign banks in Russia in terms of liquidity creation. In this context, we focus on the direct state ownership in managing banking organizations as an important governance dimension potentially driving liquidity creation given that state-owned banks have a strong presence in the Turkish banking system.

Unlike the profit-maximization motives of private banks, state-owned banks embed social objectives in corporate mandates, which is likely to enable them to create more liquidity (Micco et al., 2007; Brei and Schclarek, 2015; Bertay et al., 2015). However, these entities are also likely to face additional governance problems, agency conflicts and inefficiencies hinting at potentially lower level of liquidity creation relative to private counterparts. Prior evidence on this front is also somewhat mixed. The findings of Boubakri et al. (2023) suggest that state ownership is inversely related to the extent of liquidity creation. Contrastingly, Akın and Özsoy (2022) find that state-owned banks generate more liquidity than private counterparts during certain phases (e.g., before elections).

Against this background, to assess how bank ownership explains the variation in the liquidity creation, we use the following empirical model:

$$LC_{it} = \beta State_i + \theta X_{it-1} + \gamma_t + \varepsilon_{it} \quad (4)$$

where LC represents the constructed proxies of liquidity creation, $State$ is a binary variable taking the value of one for banks with the majority ownership belonging to government, otherwise assuming the value of zero. Similar to our general approach, the model is augmented with bank-controls (X) and time (γ_t) fixed effects. However, we drop the bank fixed effects just to be able to estimate the role of ownership composition that is a bank-invariant dimension.

Estimation results are given in Table 5. Again, we choose to follow an iterative approach to ensure the robustness of our results. Specifically, in column (1), we add fixed effects (the ones that are feasible to include given the data structure of main covariates) to analyze the proxy $L1$, while we incorporate bank controls in column (2) and proceed with limited bank sample (largest banks) in column (3). The rest of columns in Table 5 implement the same approach for alternative liquidity creation indicators ranging from $L2$ to $L10$. Overall, we observe that state-owned banks perform better in terms of creating liquidity for the rest of the economy contrasted with non-state banks. This finding is observed for the overwhelming majority of specifications, except for a few cases involving $LC4$ and $LC5$.

[Insert Table 5 Here]

IV.III. Consequences of Bank Liquidity Creation

Bank Risk

After obtaining some insights on features of bank liquidity creation, we investigate potential implications of the liquidity creation process by testing two popular hypotheses in the banking literature on the case of Türkiye. In this sub-section, we first focus on whether liquidity creation leads to more bank risk or whether additional liquidity helps alleviating risk-taking behavior.

The banking literature offers contrasting theoretical propositions and empirical evidence on the relationship between liquidity creation and financial stability. On the one hand, the high liquidity creation hypothesis argues that liquidity creation increases the bank risk. This line of thinking is based on the observation that the liquidity creation process inherently exposes banks to more solvency risk as the banks creating more liquidity for the rest of the economy are likely to face severe losses if they have to dispose of illiquid assets to meet sudden spikes in liquidity demands of customers (Berger and

Bouwman, 2009). The risk transformation function of traditional financial intermediaries by collecting riskless deposits to finance risky loans, which is also the backbone of the liquidity creation concept, makes these institutions prone to liquidity crunches and bank runs (Diamond, 1984; Boyd and Prescott, 1986). Liquidity shortages are known to facilitate the propagation of shocks from one bank to another during financial crises, thereby triggering contagion effects and systemic disruption in the financial system as evident during the Global Financial Crisis. It is argued that, during boom periods characterized with robust deposit inflows, banks tend to lower lending standards, abstain from exercising clauses in loan commitments and debt covenants, undertake excessive risk-taking, inflate leverage, boost liquidity creation beyond optimal levels, and feed asset bubbles, all of which are likely to increase the fragility of the banking system and the severity of systemic risk (while decreasing bank profitability) when the bust phase of financial cycles occurs (Thakor, 2005; Brunnermeier et al., 2012; Acharya and Naqvi, 2012; Tran et al., 2016; Acharya and Thakor, 2016). Berger and Bouwman (2017) find that aggregate liquidity creation deviating upward from its historical trend is a successful predictor of impending banking crises. In a cross-country study, Berger et al. (2019) document that the liquidity creation of commercial banks hampers the financial stability.

On the other hand, the weak fundamentals hypothesis claims that liquidity creation decreases bank risk. This set of arguments is based on the idea that banks reduce risks for the overall economy while engaging in the core activities of liquidity creation such as bundling the loan portfolio or undertaking screening and monitoring activities following lending decisions, or alleviating interest rate risks for depositors. Therefore, banks that fail are expected to display weaker ex-ante characteristics related to the aforementioned core functions including but not limited to a deteriorating liquidity position (Meyer and Pifer, 1970, Cole and White, 2012). In this context, a lower level of liquidity creation may be regarded as a symptom of a bank's inability to manage its balance sheet and maintain essential functions, eventually leading to the buildup of weaker bank solvency (Fungáčová et al., 2021). Chatterjee (2018) finds that bank liquidity creation typically declines a year prior to economic downturns. Davydov et al. (2021) document that liquidity creation decreases systemic risk at the bank level after controlling for other factors. Díaz and Huang (2017) argue that banks with superior governance (and potentially with diminished risk) are able to create more liquidity. Vazquez and Federico (2015) utilize net stable funding ratio as a proxy of liquidity creation and demonstrate that banks with a lower level of liquidity creation are more likely to fail during a crisis. However, it should be noted that the association between liquidity creation and financial stability can be shaped by the

scope and size of the bank operations in emerging markets as emphasized by Gupta and Kashiramka (2020).

To evaluate the externalities of bank liquidity creation process in terms of bank riskiness, we employ the following empirical specification:

$$Bank\ Risk_{it} = \beta LC_{it-1} + \theta X_{it-1} + \delta_i + \gamma_t + \varepsilon_{it} \quad (5)$$

where the main outcome variable, *Bank Risk*, is defined as the commonly used Z-score measure of bank solvency. It is constructed by summing the capital ratio and the return on assets that is divided by the standard deviation of return on assets (which is calculated at 12-months moving window for the sake of this empirical exercise). Z-score measure defines the required decline in profitability necessary for a bank to deplete its equity and become insolvent. Under the assumption that bank profits are shaped by a normal distribution, Z-score has a probabilistic interpretation reversely and monotonically analogous to the likelihood of insolvency (Lepetit and Strobel, 2013, 2015). Higher values of the indicator convey a greater distance to default. Although there are other alternative measures used in the literature to represent specific types of bank risk such as credit risk, market risk, interest rate risk, FX risk and operational risk, our preferred indicator is considerably informative given that it is an aggregate representation of overall bank riskiness and a well-performing predictor of bank failure (Chiaramonte et al., 2016; Manaseer and Al-Oshaibat, 2018; Lepetit et al., 2021). The main independent variable, *LC*, still refers to the set of original liquidity creation indicators that are derived with Turkish data. The model given in Equation (5) is estimated with the same set of bank controls (*X*), bank fixed effects (δ_i) and time fixed effects (γ_t).

The empirical findings are shown in Table 6. We decide to follow the same approach as before and estimate the models in an iterative way by employing all generated liquidity creation proxies with varying content and definitions. In columns (1) to (3), we consider *LC1* as the main covariate and analyze the effect of *LC1* on *Bank Risk*. Column (1) works with the simple specification with fixed effects, whereas column (2) incorporates time-varying bank controls. Lastly, column (3) estimates the full specification albeit with a narrower sample coverage, which only includes the largest Turkish banks. The same set of exercises is repeated to exhaust all possible liquidity creation variables defined by us, ranging from *LC2* to *LC10*. The initial inference gathered by these estimations is that, considering the full sample, liquidity creation is found to increase *Bank Risk* (decrease Z-score measure of solvency) rendering support to the earlier high liquidity creation

hypothesis. However, when limited sample of large banks is considered, our findings tend to change as we find a positive coefficient on *LC* variables (in predicting *Bank Risk*), which implies that the bank liquidity creation process curtails individual bank risk and improves the financial stability. This might be in line with the weak fundamentals hypothesis. However, it should be noted that the statistical significance level is somewhat lower for this finding (even without significance for certain *LC* variables). Nevertheless, it must be emphasized that our results do not directly reveal a causal relationship, instead they suggest a strong correlation between bank risk and liquidity creation.

[Insert Table 6 Here]

Economic Growth

The second externality of liquidity creation process addressed by this paper (for the Turkish case) is economic growth. On- and off-balance sheet liquidity creation enables economic entities to contribute to economic growth. Firms obtain loans to fund working capital and investment needs, whilst households deposit their savings to preserve the value of their wealth, to benefit from payment services and to facilitate the intertemporal smoothing of consumption (Berger and Bouwman, 2009; 2017). Hence, bank liquidity creation is expected to drive economic growth by fueling financial development, stimulating investment and consumption behavior and determining the capital allocation across the macroeconomic structure (Boubakri et al., 2021). The prior evidence is overwhelmingly in line with this conjuncture. Berger and Sedunov (2017) empirically show that US states where banks create more liquidity experience a stronger trend in GDP per capita. They also perform industry level analysis showing that industries with abundant liquidity creation perform better in terms of industrial output, except for a few sectors such as healthcare and other services. As another empirical study on bank liquidity creation and business cycles, Davydov et al. (2018) demonstrate the procyclical features of the liquidity creation process. Niu (2022) finds that banks create less liquidity when labor market conditions tighten.

However, testing the influence of bank liquidity creation on economic growth for the case of Türkiye requires us to depart from our original bank-level empirical setting and to follow a spatial approach. Thus, we proceed by associating liquidity creation with provincial growth tendencies at annual frequency (due to data constraints attributed to the locational economic activity measure). In the first step, we allocate the bank-level liquidity creation indicators (generated before) across provinces of Türkiye (81 geographical units at NUTS-3 classification) by utilizing the geographical presence of

sample banks via branch network. Specifically, we synthesize time-varying provincial liquidity measures by applying weighted sum to bank-level liquidity creation series with weights determined by the number of branches of a specific bank in a particular province (in a given year). To do that, we obtain the historical number of branches for each sample bank in all provinces from the Bank Association of Türkiye. Furthermore, we retrieve historical data on GDP growth figures of provinces from TurkStat (as well as some other province characteristics as additional control variables from the same data source). This analysis covers the sample period between 2005 and 2022 due to data availability.

To examine the influence of (province-level) liquidity creation on economic growth, we run the following regression:

$$GDP\ Growth_{pt} = \beta LC_{pt-1} + \theta Z_{pt-1} + \delta_p + \gamma_t + \varepsilon_{pt} \quad (6)$$

where *GDP Growth* refers to the annual growth rate of gross domestic product in province p at year t . In this setting, as the main independent variable, LC corresponds to the weighted liquidity creation ratio observed at province p at year $t - 1$. The model in Equation (6) is augmented with certain province-level controls (Z) including population growth, exports growth and the ratio of residents with high education. The empirical specification is saturated with province (δ_p) and year (γ_t) fixed effects.

Estimation results are available in Table 7. Columns (1), (2) and (3) use provincial liquidity creation measure based on $LC1$ proxy. Column (1) employs the naked specification only with province and year fixed effects. Column (2) adds province controls. Lastly, column (3) implements the same modelling to a sub-sample of provinces by omitting 10 smallest cities based on the population figures. The rest of Table 7 iterates the same set of estimations for other provincial liquidity creation indicators created from $LC2$ to $LC10$. In all cases, we find that liquidity creation series are positively and highly significantly related to provincial economic growth. This finding is in line with the expectation that liquidity creation process enables the non-bank elements to facilitate consumption and investment activities, which is inevitably transformed into more robust economic growth.³

³ As an additional robustness check, we depart from the earlier strategy of lagging the main explanatory variable of interest. In this context, we consider the contemporaneous impact, augment the regression specification with the time-dependent characteristics (defined by the lagged values of main outcome variables) and follow the bias-corrected method of moments estimator for dynamic panel data models outlined by Breitung et al. (2022), which show the favorable asymptotic properties. In Table A1 of the Appendix, we present the main coefficients of interest in a compact way (we omit the coefficients on lagged dependent variables as they turn out to be as expected). Overall, the findings pertaining to the alternative estimator are roughly in line with theoretical expectations for predictors and consequences of bank liquidity creation in terms of sign and

However, it should also be noted that this setting does not allow us to make causal inferences between liquidity creation and economic growth, which would require alternative research designs.

[Insert Table 7 Here]

V. Conclusion

As suggested by the financial intermediation theory, banks assume important roles in the functioning of the real economy: maturity transformation, risk diversification and liquidity creation. The latter concept is inextricably linked to the core activities of banks such as lending to economic agents with funding deficits and collecting deposits from economic agents with funding surpluses, activities that determine the level of liquidity that banks create for the rest of the economy. The banking literature has increasingly focused on this issue, especially following the seminal work of Berger and Bouwman (2009), with the proposal of the bank-level empirical proxies for liquidity creation to calculate the weighted average of balance sheet aggregates.

In this paper, we attempt to apply Berger and Bouwman's (2009) methodology to derive liquidity creation indicators for the Turkish banking industry by exploiting high-frequency regulatory datasets. In the following step, we conduct a set of analyses to test the potential predictors and consequences of liquidity creation for the case of the Turkish banking industry. Our panel regressions show that capital adequacy (relative to the regulatory capital threshold) is an influential factor in shaping the liquidity creation. In particular, we find that banks with large capital buffers (above the regulatory target) generate lower levels of liquidity. As another driver of liquidity creation, we focus on the role of competitive forces. We document that a high level of competition promotes liquidity creation tendencies. Among potential governance factors, we evaluate the role of ownership structure in liquidity creation. We find that Turkish state-owned banks create more liquidity compared to their non-state counterparts.

Regarding the possible consequences of liquidity creation, we first address financial stability implications. We conclude that excessive liquidity creation worsens banks' risk outlook by reducing the distance to default. In the last part of our analysis, we examine

significance (albeit with some changes in the significance for some liquidity creation measures in the context of certain estimations). This method is not applicable to analyze the role of time-invariant characteristics, so we have to skip the robustness of the results related to bank ownership structure in this part of the analysis.

the relationship between liquidity creation and economic performance. By transforming bank-level liquidity creation into province-level series (using the geographical distribution of Turkish banks' branch networks), we test the effect on provincial GDP growth. In line with the previous literature, we demonstrate a significant and positive relationship between spatial liquidity creation and the level of economic growth.

Overall, our results shed further light on the banking literature applicable to emerging markets, while providing important insights from a policy perspective. First, we make updated inferences about the liquidity creation function of an emerging market, Türkiye, with a bank-dependent financial system, so that our results are conventionally generalizable to other emerging market cases with higher dependence of financial inclusion on traditional bank activities. Second, we adopt a widely used methodological formation to derive high-frequency time-varying (bank-level) proxies for liquidity creation as an addition to the current toolkit for monitoring financial stability in Türkiye. These indicators can be tracked and evaluated in a timely manner in official periodic publications (i.e. the Financial Stability Report) to assess the performance of Turkish banks in supporting the rest of the economy. Third, our holistic approach allows us to collectively test the predictors and outcomes of the liquidity creation process as proposed by the prior literature. This holds valuable information for the policymaking process, as we point out the possible ways to improve liquidity creation, e.g. enhancing competitive forces in the banking industry. Last but foremost, the existence of such bank-level measures can be further used to assess how macroprudential policies shape the liquidity creation ability of Turkish banks, a study that is delegated to future projects.

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Figure 1: Liquidity Creation Measures Based on Different Definitions

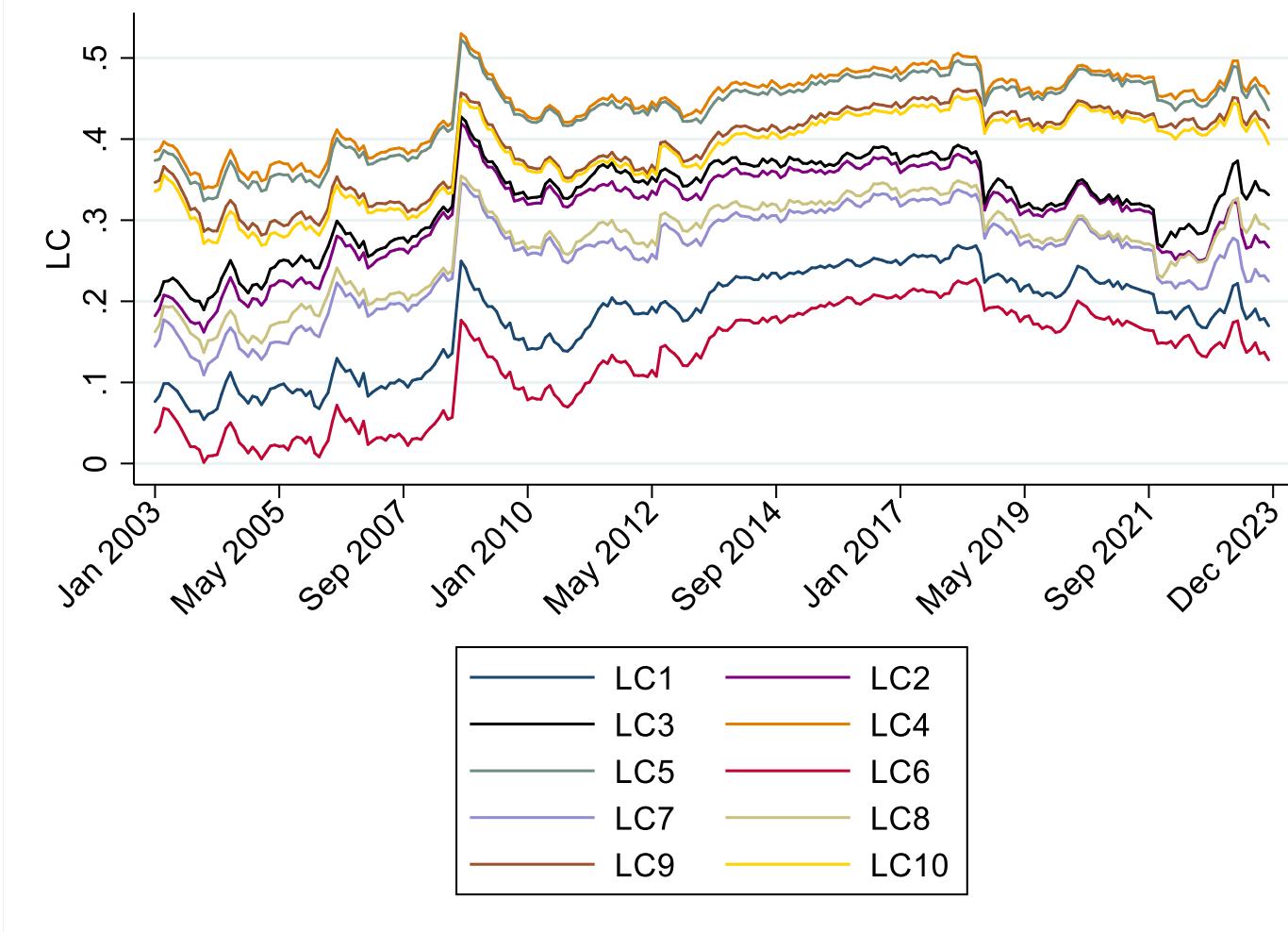


Figure 2: Liquidity Creation (LC5) by Bank Group

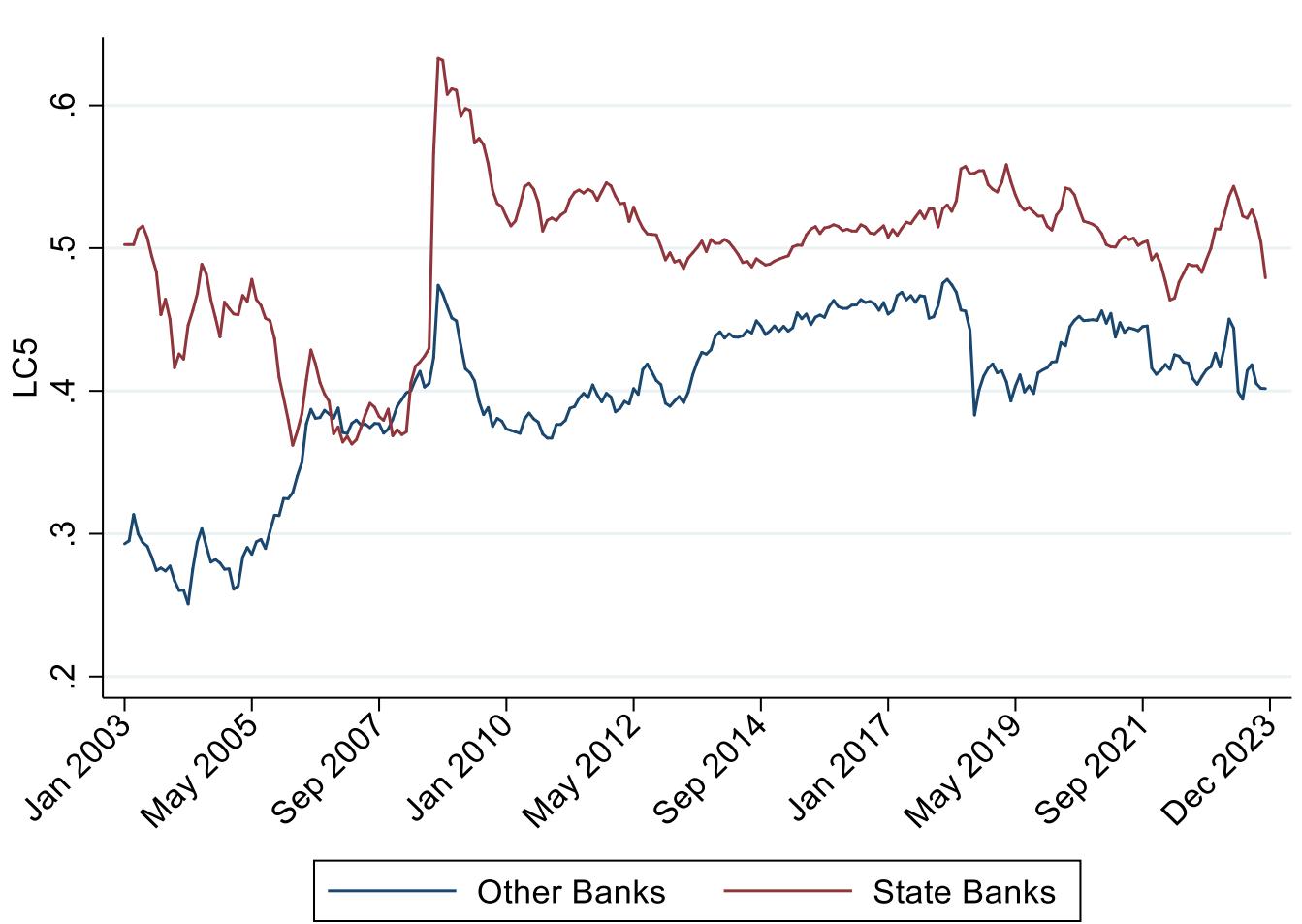


Figure 3: Liquidity Creation (LC5) by Bank Size

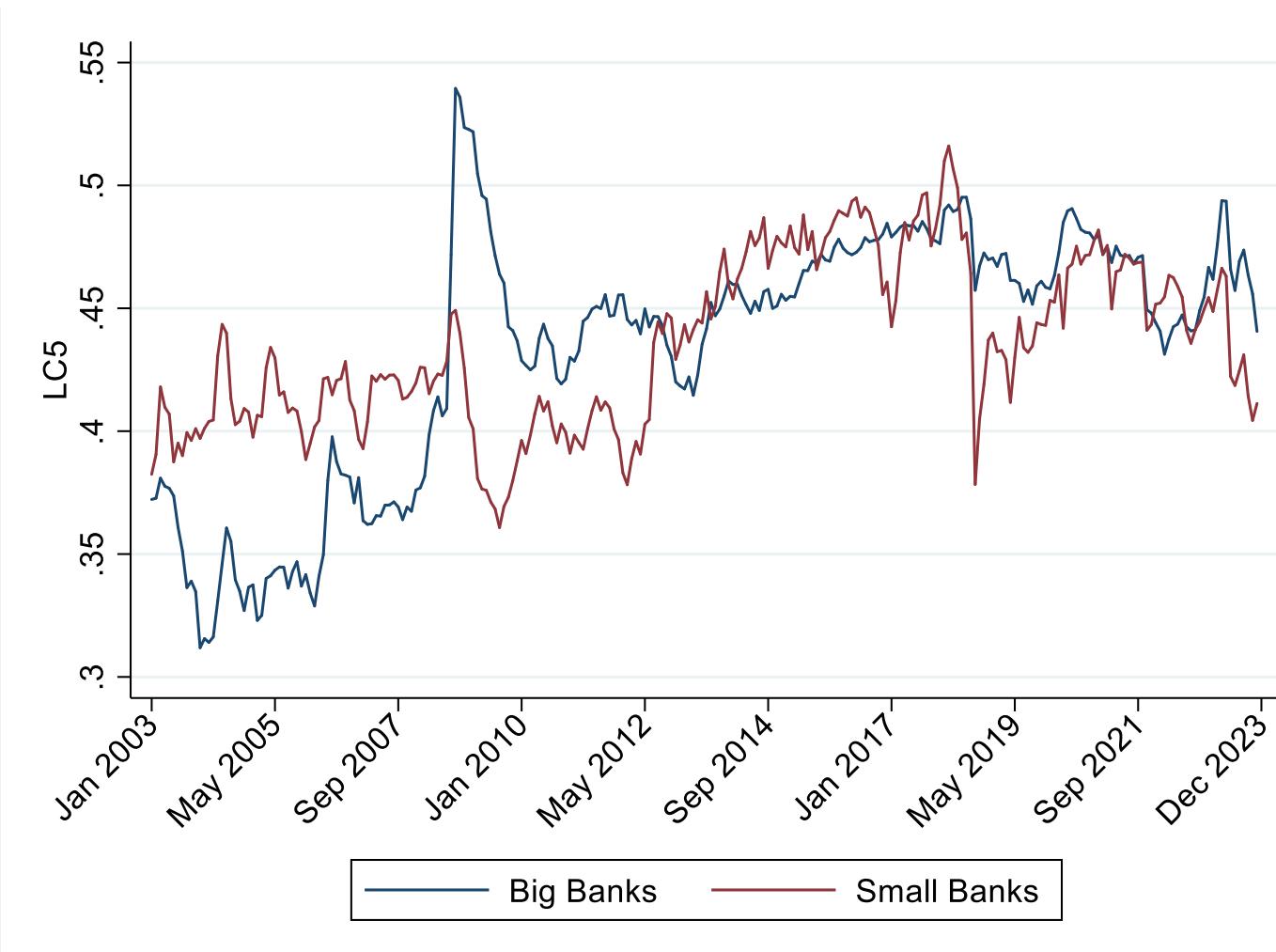


Table 1: Variable Definitions and Summary Statistics

Panel A: Variable Definitions and Data Sources			
Series	Definition	Level	Data
LC1	Contrary to LC5, TL demand deposits are defined as liquid liability	Bank	Authors' Calculations, CBRT
LC2	Contrary to LC5, TL term deposits up to 3 months of maturity are defined as liquid liability	Bank	Authors' Calculations, CBRT
LC3	Contrary to LC5, TL term deposits up to 1 year of maturity are defined as liquid liability	Bank	Authors' Calculations, CBRT
LC4	Contrary to LC5, TL and FX term deposits are up to 1 year of maturity defined as liquid liability	Bank	Authors' Calculations, CBRT
LC5	Corresponding definition of Table 2	Bank	Authors' Calculations, CBRT
LC6	Contrary to LC1, personal loans and credit card are defined as semi liquid assets	Bank	Authors' Calculations, CBRT
LC7	Contrary to LC2, personal loans and credit card are defined as semi liquid assets	Bank	Authors' Calculations, CBRT
LC8	Contrary to LC3, personal loans and credit card are defined as semi liquid assets	Bank	Authors' Calculations, CBRT
LC9	Contrary to LC4, personal loans and credit card are defined as semi liquid assets	Bank	Authors' Calculations, CBRT
LC10	Contrary to LC5, personal loans and credit card are defined as semi liquid assets	Bank	Authors' Calculations, CBRT
Capital Adequacy	The difference between the ratio of total equity to total assets and regulatory capital threshold	Bank	CBRT, BRSA
Competition	The inverse of HHI measure calculated from the market shares of individual banks with respect to total assets	Sector	Authors' Calculations, CBRT
State	A binary variable taking the value of one for state-owned banks, otherwise zero	Bank	CBRT
Risk	The z-score indicator for bank solvency defined as the sum of capital ratio and return on assets divided by the standard deviation of return on assets (over 12-month moving window)	Bank	CBRT
GDP Growth	The annual growth rate of GDP at province level (NUTS-3)	Province	TurkStat
Bank Size	The natural logarithm of total assets	Bank	CBRT
ROA	The ratio of net income to total assets	Bank	CBRT
NPL	The ratio of non-performing loans to total loans	Bank	CBRT
LLP	The ratio of general provisions to total loans	Bank	CBRT
Diversification	The ratio of non-interest income to total income	Bank	CBRT
Efficiency	The ratio of non-interest expenses to total income	Bank	CBRT
Population Growth	The annual growth rate of population at province level (NUTS-3)	Province	TurkStat
High Education	The ratio of population with higher level (university) education to total population at province level (NUTS-3)	Province	TurkStat
Exports Growth	The annual growth rate of total exports at province level (NUTS-3)	Province	TurkStat

Panel B: Summary Statistics			
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	Obs.	Mean	Std. Dev	p5	p50	p95
LC1	6,048	0.1429	0.1766	-0.2357	0.1836	0.3511
LC2	6,048	0.2524	0.2022	-0.2005	0.3006	0.4818
LC3	6,048	0.2662	0.2053	-0.2002	0.3131	0.4989
LC4	6,048	0.3894	0.2157	-0.1191	0.4440	0.6149
LC5	6,048	0.3812	0.2149	-0.1192	0.4369	0.6049
LC6	6,048	0.1018	0.1784	-0.2495	0.1356	0.3307
LC7	6,048	0.2114	0.1998	-0.2038	0.2486	0.4551
LC8	6,048	0.2252	0.2030	-0.2023	0.2607	0.4725
LC9	6,048	0.3483	0.2129	-0.1198	0.3905	0.6009
LC10	6,048	0.3402	0.2122	-0.1232	0.3846	0.5906
Capital Adequacy	6,048	0.0597	0.0919	-0.0134	0.0361	0.2697
Competition	252	9.4078	0.5795	8.2919	9.4839	10.1100
Bank Risk	5,760	141.9743	95.9838	29.5303	121.2554	333.299
GDP Growth	1,458	4.7312	5.4666	-4.3168	4.8119	13.5453
Bank Size	6,048	16.5400	2.3658	12.3788	16.7686	20.1249
ROA	6,048	0.0014	0.0026	-0.0013	0.0013	0.0051
NPL	6,048	0.0351	0.2412	0.0000	0.0081	0.0588
LLP	6,048	0.0013	0.0035	-0.00001	0.0006	0.0043
Diversification	6,048	0.1905	0.1421	0.0528	0.1817	0.3803
Efficiency	6,048	0.3674	0.5194	0.1362	0.3191	0.6469
Population Growth	1,458	0.8605	1.7538	-1.4192	0.8509	3.1937
High Education	1,458	7.9115	3.7389	2.3677	7.6291	14.4005
Exports Growth	1,458	44.0429	194.0963	-45.5921	10.6648	168.9298

Note: This table presents detailed information about the main dependent and independent variables used in the empirical analyses. Panel A provides series abbreviations, variable definitions, observation levels and data sources. Panel B provides the summary statistics of the variables including number of observations, mean, standard deviation, 5th, 50th and 95th percentile values.

Table 2: Classification of Balance Sheet items for Liquidity Creation Measures

Assets		
Liquid Assets [$weight = \left(-\frac{1}{2}\right)$]	Semi Liquid Assets [$weight = 0$]	Illiquid Assets [$weight = \left(\frac{1}{2}\right)$]
Cash	Receivables from CBRT	Securities Held to Maturity
Receivables from Money Market	Required Reserves	Premises and Equipment (Net)
Receivables from Banks	Mortgage Loans	Other Assets
Securities at Fair Value Through Profit or Loss	Non-Performing Mortgage Loans	Loans excluding Mortgage
Securities Available-for-sale		Non-Performing Loans excluding Mortgage
Receivables from Securities Interbank		
Receivables from Reverse Repo		
Interest and Income Accruals and Rediscounts		
Leasing Receivables		
Affiliates, Subsidiaries and Joint Ventures		
Assets to be Sold (Net)		
Liabilities plus equity		
Liquid Liabilities [$weight = \left(\frac{1}{2}\right)$]	Semi Liquid Liabilities [$weight = 0$]	Illiquid Liabilities [$weight = \left(-\frac{1}{2}\right)$]
Payables to the CBRT	Deposits excluding Demand Deposits and Term Deposits up to 3 Months of Maturity	Securities Issued (Net)
Payables to Money Market		Liabilities Arising from Leases (Net)
Payables to Securities Market		Taxes, Duties, Charges and Premiums Payable
Payables to Banks		Subordinated Debt (Net)
Funds from Repo Transactions		Interest and Expense Accruals and Rediscounts
Funds		Provisions
Demand Deposits and Term Deposits up to 3 Months of Maturity		Other Liabilities
<i>Off-balance sheet items</i>		Total Shareholders' Equity
Derivative Financial Instruments		<i>Off-balance sheet items</i>
		Other Commitments
		Contingencies

Note: This table presents the classification of asset, liability and equity as well as off-balance sheet items serving as inputs to the calculation of liquidity creation indicators.

Table 3: Capital Adequacy and Liquidity Creation

	(1) LC1	(2) LC1	(3) LC1	(4) LC2	(5) LC2	(6) LC2	(7) LC3	(8) LC3	(9) LC3	(10) LC4	(11) LC4	(12) LC4	(13) LC5	(14) LC5	(15) LC5
Capital Adequacy	-0.777*** (0.029)	-0.770*** (0.031)	-0.670*** (0.074)	-0.870*** (0.029)	-0.897*** (0.032)	-0.788*** (0.073)	-0.871*** (0.029)	-0.892*** (0.031)	-0.818*** (0.068)	-0.876*** (0.029)	-0.940*** (0.030)	-0.912*** (0.066)	-0.871*** (0.029)	-0.935*** (0.030)	-0.954*** (0.068)
# of Obs.	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263
Bank Controls	No	Yes	Yes												
Bank FE	Yes														
Time FE	Yes														
Adj. R ²	0.740	0.740	0.566	0.797	0.797	0.682	0.808	0.809	0.694	0.840	0.841	0.607	0.835	0.836	0.598
	(16) LC6	(17) LC6	(18) LC6	(19) LC7	(20) LC7	(21) LC7	(22) LC8	(23) LC8	(24) LC8	(25) LC9	(26) LC9	(27) LC9	(28) LC10	(29) LC10	(30) LC10
Capital Adequacy	-0.790*** (0.029)	-0.829*** (0.031)	-0.920*** (0.073)	-0.882*** (0.029)	-0.956*** (0.031)	-1.037*** (0.073)	-0.884*** (0.029)	-0.951*** (0.030)	-1.067*** (0.069)	-0.889*** (0.028)	-1.000*** (0.029)	-1.161*** (0.066)	-0.884*** (0.028)	-0.994*** (0.029)	-1.203*** (0.068)
# of Obs.	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263
Bank Controls	No	Yes	Yes												
Bank FE	Yes														
Time FE	Yes														
Adj. R ²	0.734	0.735	0.643	0.789	0.790	0.716	0.799	0.801	0.726	0.830	0.834	0.678	0.825	0.829	0.669

Note: This table presents the findings regarding the relationship between capital adequacy and liquidity creation by estimating the model specified in Equation (2). The sample comprises 24 Turkish commercial banks (6,048 bank-month observations) for the period January 2003–December 2023. Columns (1), (2) and (3) consider liquidity creation indicator *LC1* as the outcome variable. By following a sequential approach, we take the dependent variable *LC2* in columns (4), (5), (6), *LC3* in columns (7), (8), (9), ..., *LC10* in columns (28), (29), (30), respectively. The definitions of these liquidity creation measures are outlined in Section III (Methodology). The main independent variable is taken as *Capital Adequacy*, which is calculated as the difference between equity to assets ratio and regulatory capital threshold. Columns (1), (4), (7), (10), (13), (16), (19), (22), (25) and (28) run baseline specifications with bank and time (year-by-month) fixed effects. Columns (2), (5), (8), (11), (14), (17), (20), (23), (26) and (29) run saturated specifications incorporating bank level control variables *Bank Size*, *ROA*, *NPL*, *LLP*, *Diversification* and *Efficiency* in addition to the aforementioned fixed effects. Columns (3), (6), (9), (12), (15), (18), (21), (24), (27) and (30) perform the estimations for a sub-sample including only the largest 13 Turkish banks (instead of full sample). Variable definitions are presented in Table 1. Robust standard errors are given in parentheses. ***, ** and * represent the statistical significance at 1%, 5% and 10% levels, respectively.

Table 4: Competition and Liquidity Creation

	(1) LC1	(2) LC1	(3) LC1	(4) LC2	(5) LC2	(6) LC2	(7) LC3	(8) LC3	(9) LC3	(10) LC4	(11) LC4	(12) LC4	(13) LC5	(14) LC5	(15) LC5
Competition	0.058*** (0.0027)	0.039*** (0.0028)	0.059*** (0.0026)	0.073*** (0.0028)	0.059*** (0.0029)	0.085*** (0.0028)	0.069*** (0.0028)	0.053*** (0.0028)	0.073*** (0.0027)	0.042*** (0.0028)	0.019*** (0.0028)	0.032*** (0.0024)	0.044*** (0.0028)	0.021*** (0.0028)	0.034*** (0.0025)
# of Obs.	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263
Bank Controls	No	Yes	Yes												
Bank FE	Yes														
Adj. R ²	0.657	0.678	0.525	0.728	0.739	0.621	0.739	0.753	0.632	0.772	0.791	0.573	0.767	0.787	0.561
	(16) LC6	(17) LC6	(18) LC6	(19) LC7	(20) LC7	(21) LC7	(22) LC8	(23) LC8	(24) LC8	(25) LC9	(26) LC9	(27) LC9	(28) LC10	(29) LC10	(30) LC10
Competition	0.064*** (0.0028)	0.038*** (0.0028)	0.054*** (0.0026)	0.078*** (0.0028)	0.058*** (0.0029)	0.080*** (0.0027)	0.075*** (0.0028)	0.052*** (0.0028)	0.069*** (0.0027)	0.047*** (0.0028)	0.018*** (0.0028)	0.028*** (0.0025)	0.049*** (0.0029)	0.019*** (0.0028)	0.029*** (0.0026)
# of Obs.	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263
Bank Controls	No	Yes	Yes												
Bank FE	Yes														
Adj. R ²	0.627	0.661	0.584	0.707	0.725	0.667	0.716	0.739	0.678	0.741	0.771	0.620	0.735	0.767	0.609

Note: This table presents the findings regarding the relationship between competition and liquidity creation by estimating the model specified in Equation (3). The sample comprises 24 Turkish commercial banks (6,048 bank-month observations) for the period January 2003–December 2023. Columns (1), (2) and (3) consider liquidity creation indicator *LC1* as the outcome variable. By following a sequential approach, we take the dependent variable *LC2* in columns (4), (5), (6), *LC3* in columns (7), (8), (9), ..., *LC10* in columns (28), (29), (30), respectively. The definitions of these liquidity creation measures are outlined in Section III (Methodology). The main independent variable is taken as *Competition*, which is calculated as the inverse of HHI indicator based on loan market shares of sample banks. Columns (1), (4), (7), (10), (13), (16), (19), (22), (25) and (28) run baseline specifications with bank fixed effects. Columns (2), (5), (8), (11), (14), (17), (20), (23), (26) and (29) run saturated specifications incorporating bank level control variables *Bank Size*, *ROA*, *NPL*, *LLP*, *Diversification* and *Efficiency* in addition to the aforementioned fixed effects. Columns (3), (6), (9), (12), (15), (18), (21), (24), (27) and (30) perform the estimations for a sub-sample including only the largest 13 Turkish banks (instead of full sample). Variable definitions are presented in Table 1. Robust standard errors are given in parentheses. ***, ** and * represent the statistical significance at 1%, 5% and 10% levels, respectively.

Table 5: Ownership Structure and Liquidity Creation

	(1) LC1	(2) LC1	(3) LC1	(4) LC2	(5) LC2	(6) LC2	(7) LC3	(8) LC3	(9) LC3	(10) LC4	(11) LC4	(12) LC4	(13) LC5	(14) LC5	(15) LC5
State	0.108*** (0.0043)	0.012** (0.0051)	0.085*** (0.0047)	0.162*** (0.0046)	0.038*** (0.0056)	0.126*** (0.0047)	0.172*** (0.0047)	0.045*** (0.0056)	0.136*** (0.0047)	0.140*** (0.0047)	-0.008 (0.0058)	0.106*** (0.0047)	0.138*** (0.0047)	-0.009* (0.0057)	0.103*** (0.0047)
# of Obs.	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263
Bank Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Time FE	Yes Yes	Yes	Yes	Yes											
Adj. R ²	0.069	0.287	0.321	0.094	0.344	0.405	0.097	0.351	0.415	0.038	0.340	0.292	0.040	0.341	0.292
	(16) LC6	(17) LC6	(18) LC6	(19) LC7	(20) LC7	(21) LC7	(22) LC8	(23) LC8	(24) LC8	(25) LC9	(26) LC9	(27) LC9	(28) LC10	(29) LC10	(30) LC10
State	0.101*** (0.0046)	0.034*** (0.0054)	0.095*** (0.0048)	0.155*** (0.0049)	0.059*** (0.0059)	0.137*** (0.0051)	0.165*** (0.0051)	0.067*** (0.0059)	0.147*** (0.0051)	0.134*** (0.0051)	0.014** (0.0060)	0.117*** (0.0050)	0.132*** (0.0050)	0.013** (0.0059)	0.114*** (0.0049)
# of Obs.	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263	6,024	6,024	3,263
Bank Controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Time FE	Yes Yes	Yes	Yes	Yes											
Adj. R ²	0.094	0.230	0.386	0.108	0.283	0.424	0.111	0.290	0.435	0.058	0.282	0.343	0.061	0.283	0.343

Note: This table presents the findings regarding the relationship between bank ownership structure and liquidity creation by estimating the model specified in Equation (4). The sample comprises 24 Turkish commercial banks (6,048 bank-month observations) for the period January 2003–December 2023. Columns (1), (2) and (3) consider liquidity creation indicator *LC1* as the outcome variable. By following a sequential approach, we take the dependent variable *LC2* in columns (4), (5), (6), *LC3* in columns (7), (8), (9), ..., *LC10* in columns (28), (29), (30), respectively. The definitions of these liquidity creation measures are outlined in Section III (Methodology). The main independent variable is taken as *State*, which takes the value of one for state-owned banks, zero otherwise. Columns (1), (4), (7), (10), (13), (16), (19), (22), (25) and (28) run baseline specifications with time (year-by-month) fixed effects. Columns (2), (5), (8), (11), (14), (17), (20), (23), (26) and (29) run saturated specifications incorporating bank level control variables *Bank Size*, *ROA*, *NPL*, *LLP*, *Diversification* and *Efficiency* in addition to the aforementioned fixed effects. Columns (3), (6), (9), (12), (15), (18), (21), (24), (27) and (30) perform the estimations for a sub-sample including only the largest 13 Turkish banks (instead of full sample). Variable definitions are presented in Table 1. Robust standard errors are given in parentheses. ***, ** and * represent the statistical significance at 1%, 5% and 10% levels, respectively.

Table 6: Liquidity Creation and Bank Risk

	(1) Bank Risk	(2) Bank Risk	(3) Bank Risk	(4) Bank Risk	(5) Bank Risk	(6) Bank Risk	(7) Bank Risk	(8) Bank Risk	(9) Bank Risk	(10) Bank Risk	(11) Bank Risk	(12) Bank Risk	(13) Bank Risk	(14) Bank Risk	(15) Bank Risk
LC1	-23.04** (11.48)	-29.81*** (11.33)	31.71* (16.48)												
LC2				-30.03*** (10.90)	-35.28*** (10.89)	31.64* (16.66)									
LC3							-29.29*** (11.08)	-34.94*** (11.08)	41.39** (17.38)						
LC4										-19.01* (11.54)	-24.66** (11.61)	31.66* (17.65)			
LC5													-18.79* (11.38)	-24.03** (11.43)	32.55* (17.17)
# of Obs.	5,760	5,760	3,120	5,760	5,760	3,120	5,760	5,760	3,120	5,760	5,760	3,120	5,760	5,760	3,120
Bank Controls	No	Yes	Yes	No	Yes	Yes									
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes									
Time FE	Yes	Yes	Yes	Yes	Yes	Yes									
Adj. R ²	0.399	0.406	0.495	0.400	0.406	0.495	0.400	0.406	0.495	0.399	0.405	0.495	0.399	0.405	0.495
	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)
	Bank Risk	Bank Risk	Bank Risk	Bank Risk	Bank Risk	Bank Risk									
LC6	-30.59*** (11.24)	-38.07*** (11.09)	24.99 (17.03)												
LC7				-37.59*** (10.75)	-43.72*** (10.72)	24.25 (17.11)									
LC8							-36.87*** (10.86)	-43.38*** (10.84)	32.38* (17.47)						
LC9										-27.33** (11.18)	-34.07*** (11.28)	23.00 (17.84)			
LC10													-27.01** (11.05)	-33.30*** (11.13)	23.99 (17.36)
# of Obs.	5,760	5,760	3,120	5,760	5,760	3,120	5,760	5,760	3,120	5,760	5,760	3,120	5,760	5,760	3,120
Bank Controls	No	Yes	Yes	No	Yes	Yes									
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes									
Time FE	Yes	Yes	Yes	Yes	Yes	Yes									
Adj. R ²	0.400	0.406	0.495	0.400	0.407	0.495	0.400	0.407	0.495	0.400	0.406	0.495	0.400	0.406	0.495

Note: This table presents the findings regarding the relationship between liquidity creation and bank risk taking by estimating the model specified in Equation (5). The sample comprises 24 Turkish commercial banks (6,048 bank-month observations) for the period January 2004–December 2023. All columns take the dependent variable *Bank Risk*, which is defined as the z-score solvency indicator calculated by summing the capital ratio and the return on assets that is divided by the standard deviation of return on assets (which is calculated at 12-months moving window). Columns (1), (2) and (3) consider liquidity creation indicator *LC1* as the independent variable. By following a sequential approach, we take the independent variable *LC2* in columns (4), (5), (6), *LC3* in columns (7), (8), (9), ..., *LC10* in columns (28), (29), (30), respectively. The definitions of these liquidity creation measures are outlined in Section III (Methodology). Columns (1), (4), (7), (10), (13), (16), (19), (22), (25) and (28) run baseline specifications with bank and time (year-by-month) fixed effects. Columns (2), (5), (8), (11), (14), (17), (20), (23), (26) and (29) run saturated specifications incorporating bank level control variables *Bank Size*, *ROA*, *NPL*, *LLP*, *Diversification* and *Efficiency* in addition to the aforementioned fixed effects. Columns (3), (6), (9), (12), (15), (18), (21), (24), (27) and (30) perform the estimations for a sub-sample including only the largest 13 Turkish banks (instead of full sample). Variable definitions are presented in Table 1. Robust standard errors are given in parentheses. ***, ** and * represent the statistical significance at 1%, 5% and 10% levels, respectively.

Table 7: Liquidity Creation and Economic Growth

	(1) GDP Growth	(2) GDP Growth	(3) GDP Growth	(4) GDP Growth	(5) GDP Growth	(6) GDP Growth	(7) GDP Growth	(8) GDP Growth	(9) GDP Growth	(10) GDP Growth	(11) GDP Growth	(12) GDP Growth	(13) GDP Growth	(14) GDP Growth	(15) GDP Growth	
LC1	19.06** (8.01)	19.44** (8.14)	26.94*** (9.76)													
LC2				33.51*** (9.88)	33.54*** (10.0)	26.94*** (9.76)										
LC3							35.89*** (9.88)	33.54*** (10.0)	26.94*** (9.76)							
LC4										26.21*** (9.07)	26.23*** (9.19)	36.76*** (10.34)				
LC5													25.79*** (9.05)	25.78*** (9.17)	36.42*** (10.09)	
# of Obs.	1,377	1,377	1,173	1,377	1,377	1,173	1,377	1,377	1,173	1,377	1,377	1,173	1,377	1,377	1,173	
Province Controls	No	Yes	Yes													
Province FE	Yes															
Time FE	Yes															
Adj. R ²	0.328	0.329	0.356	0.332	0.332	0.361	0.332	0.333	0.361	0.330	0.330	0.358	0.330	0.330	0.358	
	(16) GDP Growth	(17) GDP Growth	(18) GDP Growth	(19) GDP Growth	(20) GDP Growth	(21) GDP Growth	(22) GDP Growth	(23) GDP Growth	(24) GDP Growth	(25) GDP Growth	(26) GDP Growth	(27) GDP Growth	(28) GDP Growth	(29) GDP Growth	(30) GDP Growth	
LC6	23.29*** (8.46)	23.69*** (8.62)	29.42*** (10.09)													
LC7				35.54*** (9.732)	35.56*** (9.887)	43.14*** (10.47)										
LC8							37.55*** (9.97)	37.50*** (10.11)	44.36*** (10.63)							
LC9										29.51*** (9.23)	29.52*** (9.36)	37.61*** (10.34)				
LC10													28.95*** (9.18)	28.94*** (9.31)	37.13*** (10.25)	
# of Obs.	1,377	1,377	1,173	1,377	1,377	1,173	1,377	1,377	1,173	1,377	1,377	1,173	1,377	1,377	1,173	
Province Controls	No	Yes	Yes													
Province FE	Yes															
Time FE	Yes															
Adj. R ²	0.329	0.329	0.357	0.333	0.333	0.361	0.333	0.334	0.362	0.331	0.331	0.359	0.331	0.331	0.359	

Note: This table presents the findings regarding the relationship between liquidity creation and economic growth by estimating the model specified in Equation (6). The sample comprises 81 provinces (NUTS-3 level) of Türkiye (1,458 province-year observations) for the period 2005-2022. All columns take the dependent variable *GDP Growth*, which is defined as the annual growth rate of provincial GDP. Columns (1), (2) and (3) consider the provincial liquidity creation indicator *LC1* (distributed from bank level information to provinces by using bank branch network as the reference point) as the independent variable. By following a sequential approach, we take the independent variable *LC2* in columns (4), (5), (6), *LC3* in columns (7), (8), (9), ..., *LC10* in columns (28), (29), (30), respectively. The definitions of these liquidity creation measures are outlined in Section III (Methodology). Columns (1), (4), (7), (10), (13), (16), (19), (22), (25) and (28) run baseline specifications with province and time (year) fixed effects. Columns (2), (5), (8), (11), (14), (17), (20), (23), (26) and (29) run saturated specifications incorporating province level control variables *Population Growth*, *High Education* and *Exports Growth* in addition to the aforementioned fixed effects. Columns (3), (6), (9), (12), (15), (18), (21), (24), (27) and (30) perform the estimations for a sub-sample by dropping 10 smallest provinces based on population figures (instead of full sample). Variable definitions are presented in Table 1. Robust standard errors are given in parentheses. ***, ** and * represent the statistical significance at 1%, 5% and 10% levels, respectively.

Appendix

Figure A1: Liquidity Creation Measure LC5 Including Swap Transactions

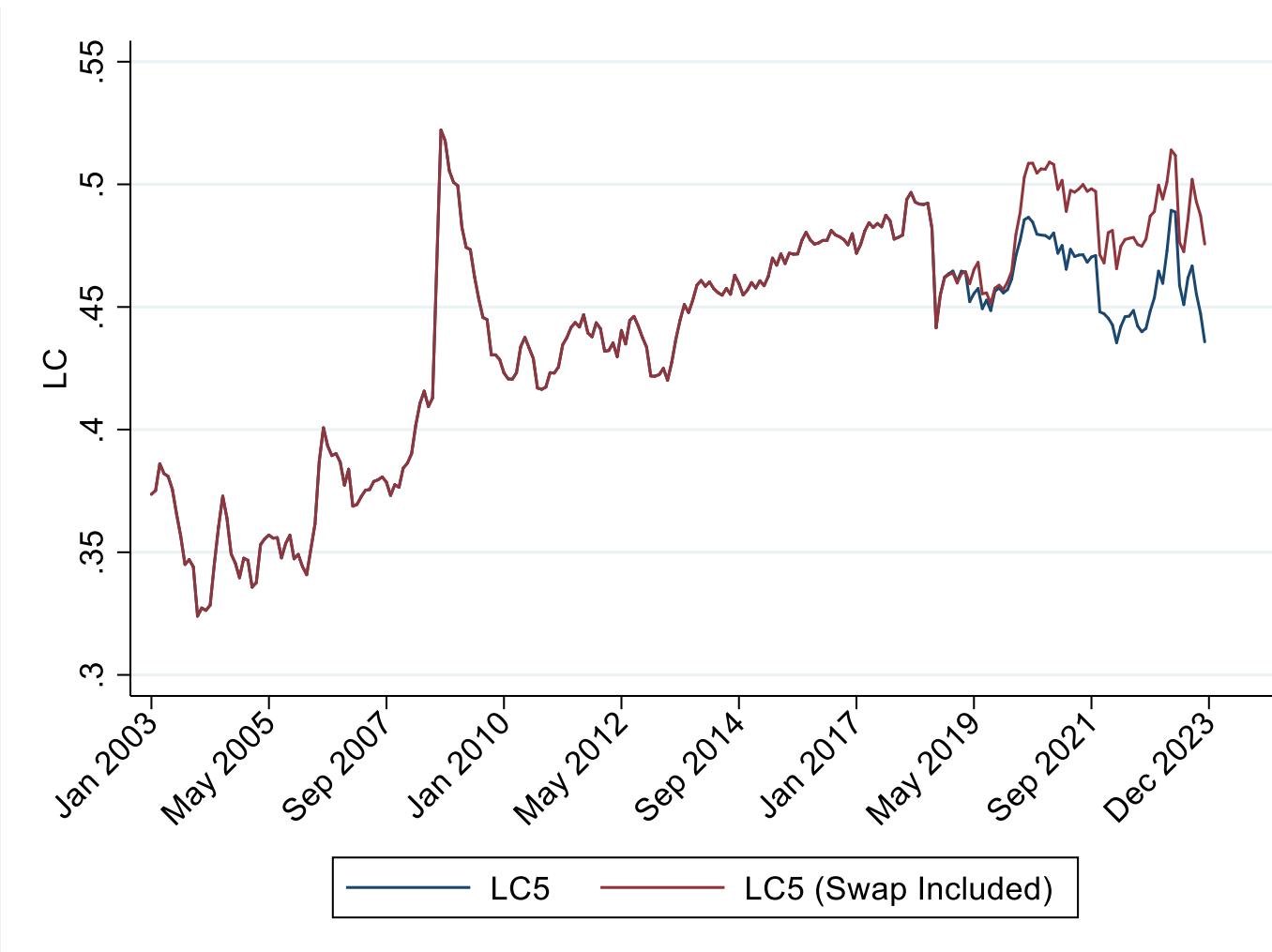


Table A1: Bias-Corrected Estimation Results for Dynamic Panel Data Models

Panel A	(1) LC1	(2) LC2	(3) LC3	(4) LC4	(5) LC5	(6) LC6	(7) LC7	(8) LC8	(9) LC9	(10) LC10
Capital Adequacy	-0.049** (0.021)	-0.046** (0.019)	-0.046** (0.018)	-0.045** (0.018)	-0.045** (0.017)	-0.055** (0.023)	-0.054*** (0.019)	-0.053*** (0.019)	-0.051*** (0.017)	-0.051*** (0.016)
# of Obs.	6,024	6,024	6,024	6,024	6,024	6,024	6,024	6,024	6,024	6,024
Bank Controls	Yes									
Bank FE	Yes									
Time FE	Yes									
Panel B	(1) LC1	(2) LC2	(3) LC3	(4) LC4	(5) LC5	(6) LC6	(7) LC7	(8) LC8	(9) LC9	(10) LC10
Competition	0.0018* (0.0009)	0.0018** (0.0008)	0.0012 (0.0008)	0.0010 (0.0008)	0.0011 (0.0008)	0.0022** (0.0009)	0.0023** (0.0009)	0.0017** (0.0008)	0.0015* (0.0008)	0.0016** (0.0008)
# of Obs.	6,024	6,024	6,024	6,024	6,024	6,024	6,024	6,024	6,024	6,024
Bank Controls	Yes									
Bank FE	Yes									
Time FE	No									
Panel C	(1) Bank Risk (LC1)	(2) Bank Risk (LC2)	(3) Bank Risk (LC3)	(4) Bank Risk (LC4)	(5) Bank Risk (LC5)	(6) Bank Risk (LC6)	(7) Bank Risk (LC7)	(8) Bank Risk (LC8)	(9) Bank Risk (LC9)	(10) Bank Risk (LC10)
LC (Bank-Level)	-5.279* (2.886)	-4.839 (3.222)	-4.686 (3.421)	-4.327 (4.386)	-4.429 (4.285)	-6.293** (2.909)	-5.926* (3.047)	-5.771* (3.198)	-5.470 (3.774)	-5.549* (3.075)
# of Obs.	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760	5,760
Bank Controls	Yes									
Bank FE	Yes									
Time FE	Yes									
Panel D	(1) GDP Growth (LC1)	(2) GDP Growth (LC2)	(3) GDP Growth (LC3)	(4) GDP Growth (LC4)	(5) GDP Growth (LC5)	(6) GDP Growth (LC6)	(7) GDP Growth (LC7)	(8) GDP Growth (LC8)	(9) GDP Growth (LC9)	(10) GDP Growth (LC10)
LC (Province-Level)	10.40 (8.47)	23.44*** (8.29)	25.27*** (8.26)	17.64** (8.85)	18.28** (8.76)	8.19 (8.77)	19.82** (8.35)	21.51*** (8.33)	14.47 (9.07)	15.09* (8.94)
# of Obs.	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377
Province Controls	Yes									
Province FE	Yes									
Time FE	Yes									

Note: This table presents the findings of the robustness analysis for regression estimations, which investigates both predictors and consequences of bank liquidity creation. In this sense, these analyses replicate Tables 3 to 7 (except for Table 5 due to the limitations of the alternative estimator accounting for time-invariant bank features). Unlike fixed effects static panel data analysis, in this case, we introduce the lagged dependent variables to the model and adopt the bias-corrected method of moments estimator for dynamic panel data models proposed by Breitung et al. (2022). Panels A and B re-estimate the relationship between capital adequacy and bank liquidity creation as well as the relationship between sectoral competition and bank liquidity creation, respectively. Panel C repeats the estimations for the impact of bank liquidity creation on bank risk, whereas Panel D examines the impact of the former on economic growth by utilizing province-level data. The set of controls and fixed effects are exactly the same of the baseline estimations. Variable definitions are presented in Table 1. Robust standard errors are given in parentheses. ***, ** and * represent the statistical significance at 1%, 5% and 10% levels, respectively.

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