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FUNDING STABILITY AND THE PRICING OF RETAIL RATES: EVIDENCE FROM TURKISH BANKING SECTOR?

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Abstract: This paper documents how a system wide deterioration in funding quality, which we argue to be underpinned by macroeconomic conditions, can have a substantial effect in the pricing of deposit and loan rates. The study is motivated by a puzzling observation from Turkish banking system. During 2015-2016, retail rates of Turkish banks displayed a persistent upward trend when the policy and money market rates remained unchanged. We conjecture that the underlying reason was the continued deterioration in the structural liquidity positions of Turkish banks, reflected as rising loan-to-deposit ratios (LDR). Our results show that in the presence of increasing pressures from worsening funding quality, banks with high LDRs tried to attract more deposits while trying to slow down loan growth rates. To this end, these banks offered higher rates to deposits, particularly, to more stable deposit types. Similarly, evidence suggest that, on the loans side, banks with worse funding quality raised the rates more. As expected, banks increased the rates for the clients/segments where they have more market power. On the other side, despite the increasing pressures on interest rate margins, high LDR banks don't seem to have opted for risky loans.

JEL Classification: D22, E43, G21
Keywords: Retail rates, banks, financial stability, macro-financial linkages

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1. Introduction

Deposit and loan interest rates (retail rates) have a significant impact on real economy and banks' financial performance, as well. They also have a central role in monetary policy transmission. Therefore, understanding how retail rates are determined and how monetary policy affects those rates are of great interest for macroeconomic and financial stability policies. In accord with its importance, a substantial amount of empirical work has accumulated on the determination of retail rates. Studies on microeconomics of banking, and interest rate pass-through literature propose a long list of possible factors that can affect retail rates, though there is not a wide consensus in between the findings of related empirical work.

By using Turkish data, this paper documents how a deterioration in funding quality of banks, measured by loan-to-deposit ratio (LDR), can have a substantial effect in the pricing of retail rates. To the best of our knowledge, the potential effect of loan-to deposit ratio on the pricing of retail rates has not been discussed before in the related strands of literature.[3] In essence, we find that to preserve their funding quality banks try to attract more deposits while trying to slowdown loan growth. To this effect, banks raise the interest rates on both deposit and loans, with the latter increasing significantly more than the former. On the deposit side, banks raise the rates for sticky deposits more. On the loans side, increases in rates are higher for the segments/clients where banks have more pricing power and for riskier loans.

The results of this study are of interest for several strands of literature. By identifying a variable that affects the determination of retail rates, i.e., funding quality, and by documenting how banks react to pressures on funding quality, the paper contributes to the empirical literature on microeconomics of banking. Relatedly, the findings of the paper are also of relevance for interest rate pass-through literature,[4] as the paper documents that the deterioration in funding quality might weaken the relation between the market/policy rates and retail rates considerably. Finally, the paper proposes an explanation for the consistent deterioration in funding quality and investigate banks' behavior towards risk taking in response to increasing constraints for lending growth due of funding quality, which are relevant macro-financial linkages literature.[5]

Our study is motivated by a sustained deviation of retail rates from short-term market rates in Turkey during 2015-2016. Decoupling of retail rates for such a long period from market rates is intriguing, especially, considering the relative stability of the macroeconomic and financial environment during the period (until 2016 Q3). In this period, Turkish banks maintained strong capitalization levels, had a favorable short-term liquidity position (i.e., they had abundant free government bonds) and they didn't experience any problem in accessing to international liquidity. There was no discernable change in market structure that could intensify the competition for loans or deposits. Macroeconomic environment was also stable, with growth rates cruising at around historical averages, except 2016 Q3 when a major domestic political shock caused a temporary slowdown in economic activity. Consistent with the pace of economic activity, loan growth rates, were also moderate at historical standards.

We conjecture that the decoupling of retail rates from short term market rates took place because of banks' reaction to the persistent rise in LDR. The system wide LDR of Turkish banking sector increased

[3] Sorensen and Werner (2006), an emprical study on interest rate pass-through in the euro area, investigates the role of share of deposits in total liabilities as a potential factor to affect the speed of interest rate through.
[4] For microeconomic and macroeconomic factors affecting the pass-through, see, for instance, Gambocorta (2004).
[5] Claessen and Kose (2018) provides an extensive review of the macrofinancial linkages literature.

past 120% as of 2016 from below 80% in 2010. Accordingly, as the ratio ascended continuously, credit rating agencies (CRAs) started to stress the deterioration in funding quality as early as 2013.[6] Increasing reliance of banks to non-deposit (or noncore) funding also highlighted in the IMF's 2012 and 2017 financial system stability assessment reports on Turkey. In a bid to slow down or stem the rise in LDR, banks tried to attract more stable funding, namely deposits (particularly more sticky types), by offering higher rates to depositors. Over the same period, loan rates also rose, around 50-100 bps more than deposit rates did, suggesting that banks wanted to also slow down loan growth rates.

The sharp rise in our key variable, LDR, caused by the widening of the growth differential between the loan and deposit volumes, is worth a detailed explanation. In this context, we argue that banks' borrowing from abroad coupled with large current account (CA) deficits have played a pivotal role in LDR dynamics. To back our argument, first, based on balance sheets of economic units, we describe how CA deficits act as a leakage and widen the gap between loan and deposit growth rates, particularly, when it is financed by cross border banking flows. Second, by using a simple dynamic model, we show the effects of banks' borrowing from abroad on the evolution of LDR dynamics.

In the empirical part of the paper, we analyze the effect of worsening funding quality on retail rates by econometric methods. Although, the increase in LDR during the said period was common for almost all banks, there were still significant heterogeneities across banks, which enabled us to use bank level data in our analyses. As for the deposit rates, we also used different types of deposits that differ in terms of their relative stability or stickiness, which allowed us to test the several predictions of our hypothesis. For loan rates, we used firm-loan level data, which allowed us to shed light on banks' response to worsening structural liquidity conditions in a more detailed manner. In this context, for instance, we investigate whether banks diversify their pricing or lending policies across different type of loans or clients.

The results from bank level panel data estimations indicate that higher LDR puts an upward pressure on deposit rates, that is, banks with higher LDRs offer higher rates to depositors. Furthermore, significance or magnitude of LDR coefficients are higher for stickier deposit types (e.g. small ticket deposits versus large ticket deposits).

A rise in the cost of deposits, the largest liability on banks' balance sheets, is expected to exert an upward pressure on loan rates. Besides, banks may want to slow down LDR growth through decelerating loan growth. To this effect, they might increase the loan rates across the board or differentiate their prices and loan standards across different type of loans and clients. In line with our expectations, we find LDR to be effective also on loan rates. Compared to deposit rates, LDR's effect on loan rates substantially stronger.[7] Our results also show that banks increase the loan rates more for the segments or for the clients for which they have more market power. For instance, according to the estimation results, LDR's effect on housing market loans, which is the most competitive loan segment is much more muted compared to commercial loan rates. Consistently, we also find that banks increased the loan rates more for the clients that are exclusively working with them, which is considered as an indicator of relationship banking. Another interesting dimension is the effect of rising funding rates on banks' risk appetite. To preserve interest margins, banks might have opted for riskier loans. On the contrary, our results suggest that higher funding costs (deposit rates) due to LDR

[6] Moody's started to point at rising LDR of Turkish Banks as early as 2013, when the ratio reached around 100% (Moody's, 2013).

[7] Macrofinancial linkages literature documents various factors that could affect the transmission of policy rates to lending rates, e.g. banks' balance sheet positions, level of interest rates or general economic outlook (see, for instance, Claessens and Kose (2018)) for a comprehensive survey of the literature). Here, instead of policy rates, we have deposit rates and the main factor that might impact the relation between the funding cost and the lending cost is funding quality.

pressures, did not cause banks to take on more risk, if anything, they favored less risky borrowers more.[8]

In the following section, we give a detailed account of interest rate developments during 2015-2016, together with a background information on the structure of money markets and retail rates in Turkey. Then, we discuss whether the relevant literature provides a satisfactory answer for the observed decoupling between retail rates and market rates and present our hypothesis. Section 3 discusses the relation between banks' external borrowing, CA deficits and LDR. To this end, first, by using the balance sheets of economic units, we describe the mechanical relation between those variables. Then, we put this relation in a dynamic context to show how it shapes LDR dynamics. Before presenting the estimation results, in Section 4, we describe the data, the methodology and the specifications used for the analyses. The subsequent section (section 5) presents the core results of our analysis that investigate the implications of LDR on deposit and loan rates. Last section summarizes the results and provides some policy implications of our findings.

2. Observation and the Hypothesis

In this section, we provide a historical account of the retail rates dynamics during 2014-2016, which motivated this study (Graph 1a and 1b). Besides, we overview the relevant literature to see whether it helps explain the puzzling divergence between the market and the retail rates and propose our own conjecture. We start with a brief background information on Turkish money markets.

Short Term Money Market Rates

We represent short term money market rates by two different interest rates. The first is the (weighted) average cost of the central bank funding and the second is the overnight repo rate, which is based on the transactions that take place at Borsa Istanbul (BIST) repo-reverse repo market.[9]

The weighted average funding cost (WAFC) represents the volume based average cost of the central banking funding provided from different lending facilities. In principle, the central bank's main policy instrument is one week repo rate. However, during the period of interest, as the amount of lending from other policy rates (O/N repo lending, which is higher than the weekly repo) reached significant amounts, the policy rate is represented by the WAFC. The utilization of different lending facilities was an intentional policy choice for the Central bank, which wanted to signal its policy stance at a higher frequency.[10]

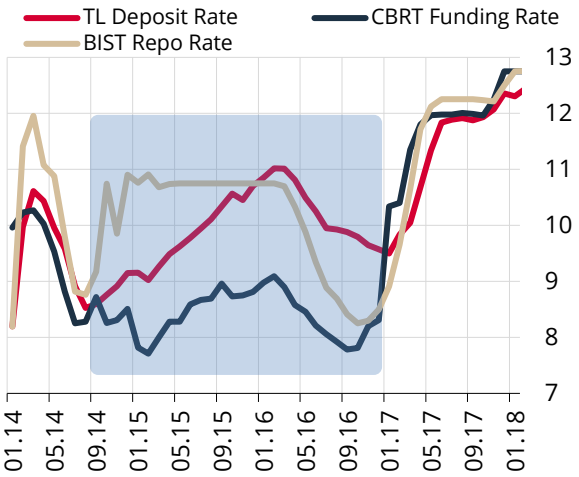
In Turkey, more than 90% of short-term borrowing among banks is carried out in the BIST repo market. An overwhelming portion of these transactions are overnight (O/N), while the volume of transactions with maturities above one-week is negligible. As the name indicates, in the BIST repo market, all transactions take the form of a repo, where the underlying assets are exclusively government bonds. Since the underlying assets are government bonds, interest rates do not reflect banks' credit risks (unlike LIBOR).

[8] This is consistent with the findings of Khan et al (2017), who documents that banks with a stronger deposit base are more inclined to take risk, also accords with the theoretical evidence provided by Acharya and Naqvi (2012), which suggests a negative relation between funding risk and bank risk taking.

[9] There is an active interbank money market in Turkey, where banks can borrow and lend among each other without pledging a collateral. However, the transaction volumes in this market are negligible compared to BIST market turnover, as banks are reluctant to take exposure to other banks.

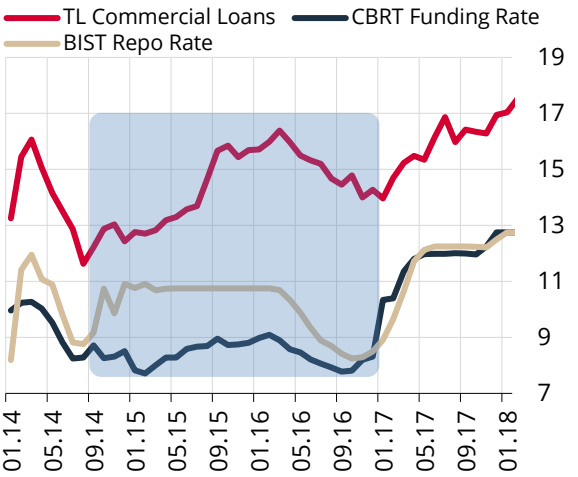
[10] The central bank started to utilize different lending/borrowing facilities to steer market rates since 2010. Binici et al, (2019) provides a detailed account of the central bank policies implemented during that period.

Graph 1a: TL Deposit Rates and Other Market Rates (Percent)



Source: CBRT Latest Data: 01.18

Graph 1b: TL Commercial Loan Rates and Other Market Rates (Percent)



Source: CBRT Latest Data: 01.18

Decoupling of Retail Rates from the Market Rates

The average maturity of deposits in Turkish Banking system is quite short, hovering below 60 days and the total volume of deposits with maturities higher than 3 months is minuscule. Hence, the correlation between TL deposit rates and money market rates is historically very strong. For instance, Binici et al (2019), which investigates the effect of the central bank rates on retail rates in Turkey during 2010-2014, find that money market rates (WAFC and BIST repo) strongly and significantly affect retail rates. However, as Graph 1a and 1b show, this relationship seems to have weakened markedly for both deposit and loan rates since the last quarter of 2014.

From October 2014 to March 2016, deposit rates exhibited an (almost linear) upward trend while the market rates remained constant at the upper bound of the interest rate corridor (O/N repo rate of the CBRT). As the upward trend in the retail rates emerged right after the policy rates had hiked sharply in 2014 Q4, one might argue that the upward trend can be explained with the sluggish adjustment of the retail rates. However, the rise in retail rates lasted about 18 months and increased past policy rates in January 2016. Moreover, considering the findings of Binici et al (2019), which suggest that the effect of WAFC on retail rates is as strong as the market rates, the retail rates dynamics are even more puzzling.[11] Unlike market rates, the WAFC did not jump in 2014 Q4, on the contrary, it declined until around mid-2015 and then increased at a slower pace than retail rates. The upward trend in retail rates were finally broken in March 2016, right after the central bank started an easing cycle (involved 7 consecutive rate cuts).[12] However, the spread between retail rates and money market rates continued to widen until the end of easing cycle (October 2016) as the decline in retail rates had been relatively more sluggish. Only in March 2017, market rates exceeded deposit rates.

These observations suggest that during the concerned period there were some factors other than the market rates that significantly affected the retail rates. Below, we discuss the possible reasons that could differentiate the retail rate dynamics from market rates.

[11] Binici et al (2019) covers the period in between January 2011- December 2014.

[12] The Monetary Policy Committee of CBRT started to reduce the Marginal Funding Rate and Late Liquidity Window Interest Rates in March 2016 and last rate cut was in September 2016. In November 2016, Committee decided to implement monetary tightening due to heightened global uncertainty and volatility, and increased the marginal funding rate, one-week repo rate and the late liquidity window rates.

Possible Explanations from the Literature

In this section, we resort to the literature for the possible explanations regarding the puzzling retail rates dynamics detailed above. We focus primarily on bank-level (or more granular) studies as papers working with cross country sector level data come up with structural factors as the drivers of retail rates (or their speed of adjustment to market rates), such as, degree of competition in the sector, monetary policy regime, which have not changed during the period of interest.

The literature documents the role of the supply of deposits as a determinant of deposit rates; if depositors become concerned about the safety of their deposits, they would demand a higher premium from banks that they deem risky (Park and Peristiani, 1998; Cook and Spellman, 1994; Martinez Peria and Schmukler, 2001). However, during this period, the domestic banks' capital adequacy ratio hovered well above the national regulatory thresholds, which were higher than the Basel standards. Besides, although there were some ups and downs in the capital adequacy indicators, they didn't have a trend that could explain the continuous rise in deposit rates. Credit rating agency reports issued in this period were also highlighting the strong capitalization rates of the banking system.[13] Also note that, as we present later in the text, interest rate on small ticket deposits, which are covered by deposit insurance were also rising during this period, suggesting that banks' solvency risks cannot be the primary reason of deposit rate dynamics in 2015-2016.

An increase in the banks' demand for deposits could lead to a rise in deposit rates. For instance, an increase in loan demand might urge banks to raise more funding, which, in turn, can result in higher returns on deposit and loan rates. Using branch level deposit rate data, Ben-David et al (2017) find that banks' loan growth has a causal effect on deposit.[14] While loan volumes were increasing in 2015-2016, regarding the historical data, it was, on average, relatively low and from 2015 Q3 on, it started to decelerate. Also note that, in the previous strong loan growth episodes, like in 2010 when annual credit growth rate increased past 50%, deposit rates did not display a discernible rise.

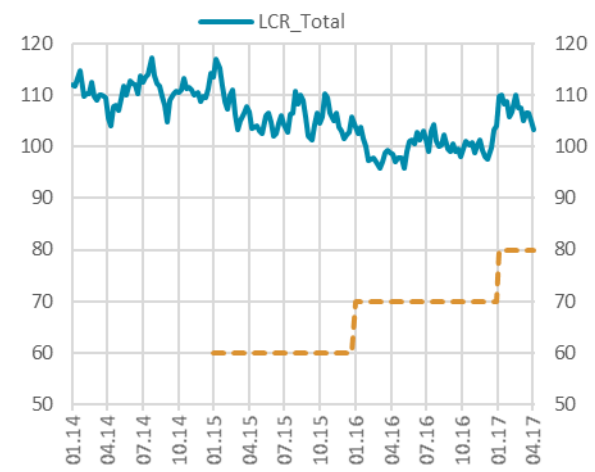
The ability of central bank rate to affect money rates and retail rates rests primarily on the assumption that banks can borrow as much as they want from central bank at the ongoing rates. In practise, central bank lends against high quality collaterals, like government bonds. Therefore, if a bank cannot tap central bank (or other wholesale markets requiring collaterals) due to lack of eligible collaterals, then the deposit rate dynamics of the bank might diverge from central bank policy rates or market rates. Acharya and Mora (2015), for instance, explore such a case that occurred during the global financial crisis in US. They document that during the global financial crisis (GFC) (until 2008 Q2), when wholesale markets were almost frozen, banks with undrawn loan commitments and lower deposit inflows had to raise deposit rates. After government support arrived, those banks decreased deposit rates more strongly. Could some banks in Turkey might experience a problem in tapping central bank or money? During 2014-2016, Turkish banks don't seem to have pressing liquidity problems. They were comfortably complying with Liquidity Coverage Ratio (LCR) regulation and holding a sizable free government bond portfolio, which were enabling them to borrow from the money markets (Graph 2).[15] To be more specific, during 2014-2016, total unencumbered bond holdings of banking system hovered around 13% of outstanding loan volume with a limited heterogeneity across the banks.

[13] See, for instance, Moody's (2016).

[14] Ben David et al (2017) also presents a comprehensive literature on the determinants of deposit rates.

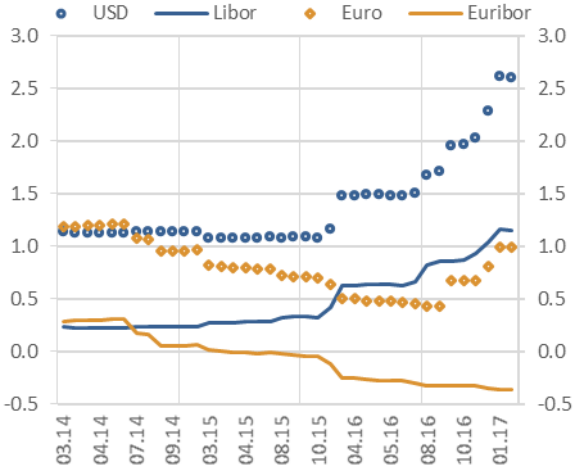
[15] The LCR regulation started to phase in January 2015. The regulation sets minimum thresholds for both TL and FX liquidity. Minimum LCR was set at 60% for 2015 and increased by 10% each year until it reached 100% in 2019.

Graph 2: Actual Liquidity Coverage Ratio versus Regulatory Minumum (Percent)



Source: CBRT Latest Data: 04.17

Graph 3: Cost of Syndicated Loans with 367 days Maturity (Percent, Transaction-based)



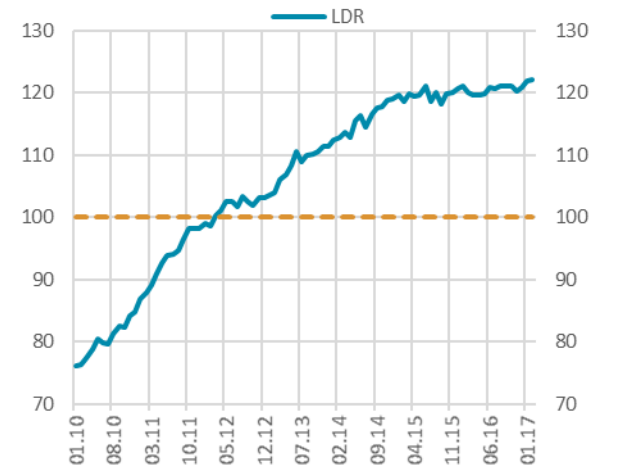
Source: Bloomberg Latest Data: 03.17

Cross border bank flows are an important source of funding for Turkish banks. Therefore, problems in domestic banks' access to funding from abroad or cost of these sources might also play a role in retail rate dynamics (i.e., by increasing demand for deposits).[16] To see whether this could be the case, we checked the cost of borrowing from abroad through syndicated loans during 2014-2016 (Graph 3). The interest rates on these loans are expressed as LIBOR (or EURIBOR) plus a spread, the latter indicating the riskiness of the borrower. From 2014 to until May 2016, USD 3-months LIBOR was almost constant, and increased gradually by around 35 basis points (bps) in the rest of the year and another 35 bps until December 2017. On the other hand, 3-months EURIBOR had been declining throughout the period, with cumulative decline from the mid 2014 to December 2017 reaching 60 bps. Over the same period, the spreads over the LIBOR and EURIBOR, which represent the risk premium charged for Turkish banks, did not move discernibly. All in all, during 2014 – 2017 cost of borrowing from abroad did not change much for Turkish banks, if anything, by increasing the euro denominated borrowing in this period Turkish banks managed to decrease the average cost of finding from abroad.

In sum, potential drivers of retail rates mentioned above are not presenting a satisfying answer to the decoupling of retail rates from market rates during 2014-2016 in Turkey. We conjecture that main driver of the retail rates in this period has been the deterioration in funding quality or structural liquidity of banks, which manifested itself as increasing loan-to-deposit ratios. In this context, we argue that after LDR reached certain levels, in a bid to limit the deterioration in their funding quality, banks tried to preserve or increase the share of deposits in their liabilities, by offering higher rates. Accordingly, the rise in loan rates stem partly from increasing cost of deposits and partly from banks' effort to slowdown loan growth, which could also improve banks' LDRs.

[16] However, note that, in principle, if banks have enough collateral to tap central bank or money markets (where rates can be perfectly anchored by the central bank), changes in cost of FX funding should not affect rates offered for TL deposits, particularly if they have very short maturities.

Graph 4: Loan-to-Deposit Ratio
(Percent)



Source: CBRT Latest Data: 02.17

LDR is the most widely used indicator of funding quality.[17] The ratio simply shows how much of the banks' key illiquid assets, namely loans, are funded by stable funding resources, namely deposits. In other words, the lower the LDR of a bank, the lower will be the dependence on wholesale loans, which are subject to significant roll-over risks. Numerous empirical studies find that LDR is a significant indicator for financial soundness of banks.[18] Accordingly, credit rating agencies (CRA) cite this ratio extensively as an indicator of the resilience of funding structure of banks. Similarly, the IMF includes deposit to total loans ratio in its financial soundness indicators.[19]

There is no regulatory threshold for LDR in Turkey. However, it is commonly accepted that figures above 100% is not desirable. Accordingly, some jurisdictions that used LDR as a regulatory ratio, set the upper limits at or below 100%. In Turkey, the LDR of banking sector has been on a rising trend since 2002 and it reached 100% in 2012 and went past 120% in 2016 (Graph 4), one of the highest among its peers (Graph 5). In addition to the level of LDR, the pace of increase in the ratio also had been worryingly strong. Accordingly, CRAs started to highlight the rise in LDR since 2013 and their warnings grew more pronounced as the ratio continued to increase (Moody's, 2013; 2014; 2016).[20]

As we analyze in more detail in section 3, by the nature of the underlying dynamic processes, LDR was set to converge to a steady state. Given the paths of the determinants of LDR, our calculation was implying a steady state roughly around 130%. Slowdown in LDR became more pronounced as the LDR got closer to its steady state. After peaking in 2016 Q3, when the economy shocked by a failed coup attempt, the LDR started to trend downwards and dropped to 91% in 2021 Q3. Starting from early 2017, market rates and central banks average funding cost took over deposit rates and they remained above it from then on.

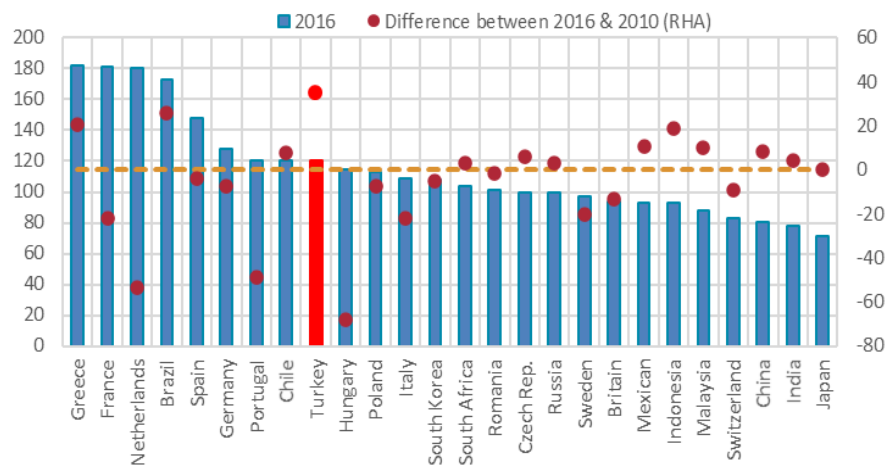
[17] Basel III introduced a liquidity regulation proposal that targets to ensure a stable funding structure for banks (BCBS, 2014). To this end, regulation proposal defines a ratio, named Net Stable Funding Ratio (NSFR) that gauges essentially the dependence of banks on short-term wholesale funding for the illiquid assets. While the ratio is more refined and takes a wider set of liability and asset items into accounts, loans and deposits remain the main drivers of the ratio.

[18] See, among others, Betz et al (2014) and Cecchetti et al (2011).

[19] In the financial assistance program that Irish government signed with IMF and the European Commission in December 2010, funding was conditional on progress in three areas, one of which was the clean up of the Ireland's financial system. In this context, bringing LDR down was set as one of the performance indicators (European Economy, 2011).

[20] Besides, the phasing in of NSFR as of 2018 was in regulatory agenda might also have rendered banks more sensitive to LDR.

Graph 5: Loan-to-Deposit Ratio of Selected Countries
(Percent)

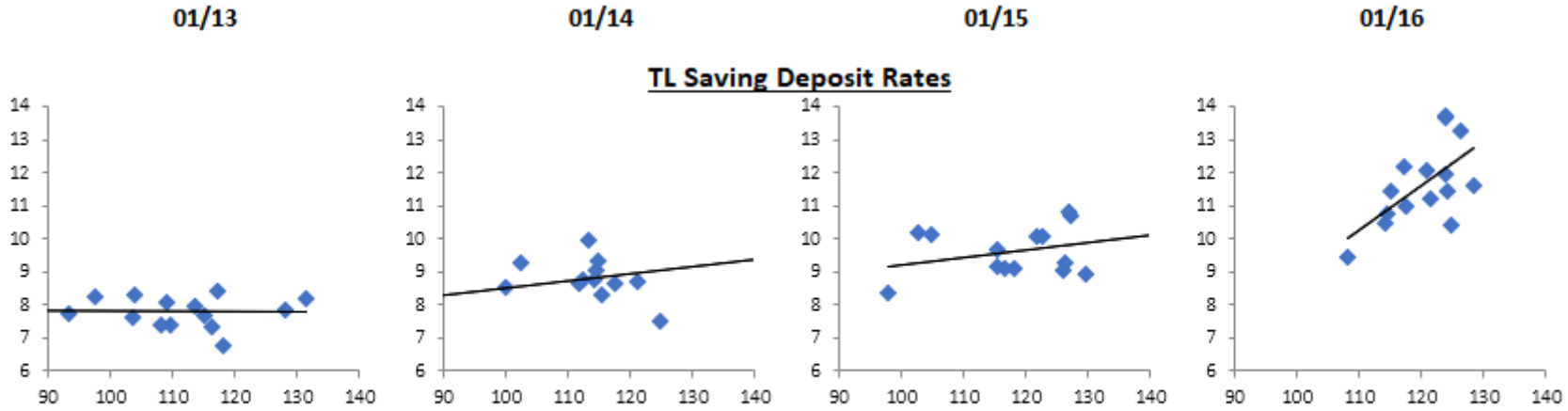


Source: Snl Financials Latest Data: 2016

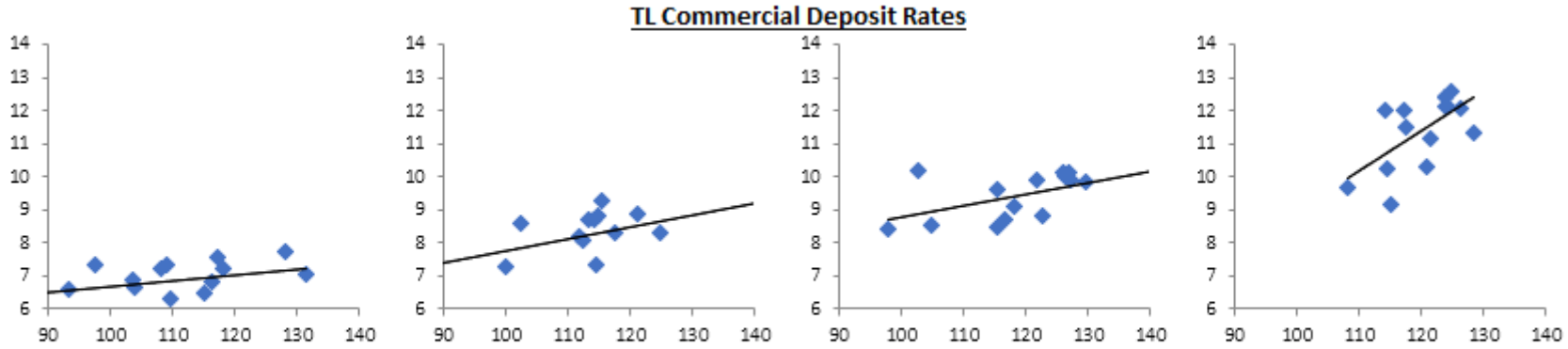
A simple visual analysis presented in Graph 6, lends a strong support to our hypothesis. The figure shows the relation between banks' LDR and deposit rates they offer for both saving deposit and commercial deposit rates as of four different dates (January 2013, January 2014, January 2015 and January 2016). The graph suggests that the positive correlation between the LDR and the deposit rates emerges or becomes more evident in 2016, where loan-to-deposit ratios reach their historical highs. Bank size (indicated by the size of circles) doesn't seem to be affecting the LDR deposit ratio significantly, as all banks hover relatively tightly around the regression line.[21] In section 4, we investigate the effect of LDR on retail rates by econometric methods and use a rich set of controls variables.

[21] To see whether short-term liquidity positions of banks, which could potentially be correlated with LDR and could also impact deposit rates, have any effect on deposit rates, we replicated Graph 3 by replacing LDR with a measure of short-term liquidity, namely, regulatory Liquidity Coverage Ratio. However, we did not find any relation between LCR and deposit rates.

Graph 6: Loan-to-Deposit Ratio & TL Deposit Rates (%)



* On x-axis of the charts, there are banks' LDR values and on the y-axis, there are **TL saving deposit rates**. 5 banks with the highest and lowest LDR ratios have been excluded.



* On x-axis of the charts, there are banks' LDR values and on the y-axis, there are **TL commercial deposit rates**. 5 banks with the highest and lowest LDR ratios have been excluded.

Source: CBRT.

3. Banks' Borrowing from Abroad, Current Account Deficit and Loan-to-Deposit-Ratio

In this section, we investigate the drivers of LDR in Turkish Banking system. We argue that large CA deficits together with domestic banks' borrowing from abroad were the main culprits of the rise in the LDR of Turkish banking sector. The section consists of two subsections. In the first part, by using balance sheet identities, we present the mechanic relation between the financing of CA deficits and LDR. In the second part, resorting to a simple dynamic model, which is calibrated to the Turkish economy, we show how CA deficits and banks' external borrowings shape LDR dynamics.

3.1. Financing of Current Account Deficits and LDR[22]

Under a given asset (liability) composition, an increase in reliance to non-deposit funding (share of loans in total assets) increase LDR. This could happen, for instance, when households change their saving preferences towards investing more in money market funds rather than in deposits. Considering the fact that money market funds lend a significant amount of their liquidity to banks, under such a case, household savings would enter into bank balance sheets in the form of repo or wholesale funding provided through money market funds, while bank deposits decline.[23,24] Indeed, according to Wetmore (2004), the significant rise of LDR in the US banking system in early 1990s can be ascribed to the growing inclination among savers to invest in non-deposit instruments including money market funds.

In emerging and developing countries (EMDE), including Turkey, non-core funding mostly consists of external borrowing and to a lesser extent takes the form of liabilities to other domestic financial institutions (e.g. borrowings from interbank), as domestic wholesale money markets are generally nonexistent or very shallow (Hahm et al (2012)).[25] Therefore, large increases in banking sector's LDR generally arise as a result of rapid credit growth episodes fueled by external borrowing by domestic banks, which accompanied by current account deficits.

Historically, the episodes of rapid credit growth financed by external growth are triggered by an improvement in access to global liquidity. One may make a long list of factors that determines the length or impact of such episodes. At least some of these factors are related to the behavior of other balance sheet items, particularly, whether the FX liquidity channeled into domestic economy through cross border bank flows is being transferred back to abroad by non-bank economic units. For EM's, current account deficits are the main absorber or "leakage" for the inflows. [26,27]

When there is no leakage, the effect of borrowing from abroad on banks' balance sheets would look like the money multiplier mechanism in a closed economy; where a given amount of liquidity injected

[22] Here, we only discuss the case where CA deficits financed by FX loans granted by doemstic banks. See Appendix 1 for the effects of alternative financing channels on LDR..

[23] Note that, here we assume money market funds are lending part of their liquidity to banks.

[24] In a closed economy, there are many other possibilities that would decrease the deposits in the system, like increase in cash demand, tax payments to government, banks selling their securities portfolio to other economic units. However, these are very unlikely to create a sustained and substantial decline in deposits or a rise in LDR.

[25] In Turkey, repo market is relatively large; however, the Central Bank lending makes up for a sizable part of the market transactions.

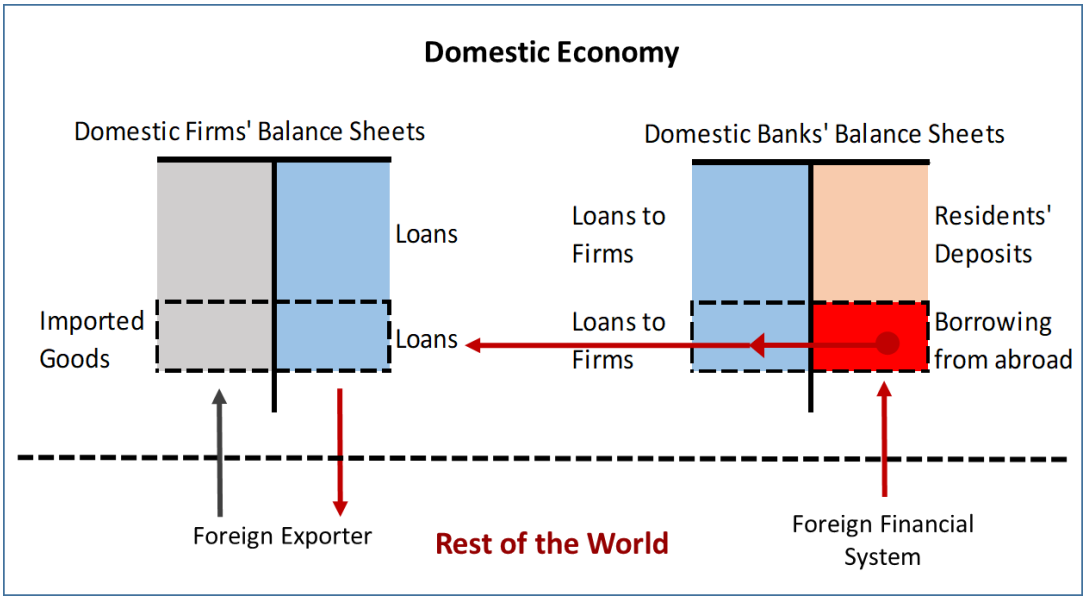
[26] In principle, domestic households' or firms' financial investments abroad (capital outflows) can also act like a leakage, however, unlike advanced countries, in EM economies, typically, net and gross flows do not diverge much from each other. In Turkey, for instance, excluding the central bank's reserves and banks' assets abroad, total international assets are about 15% of total international liabilities.

[27] Certainly, CA balance is exogenous to capital flows. or instance, when global liquidity conditions ease, ensuing improvement in the availability and the cost of external borrowing for EM economies leads to the appreciation of domestic currencies and bring about a deterioration in current account balances. Yet, while global financial conditions can affect CA dynamics, the CA balance of each country will be affected differently depending on countries' structural macroeconomic features, as well as the policies countries pursue (e.g. central banks' FX interventions, macroprudential measures).

by the central bank create much higher volumes of loans and deposits.[28] In this case, loan-to-deposit ratio will converge to one. Note that under this assumption banks' need for non-deposit funding will be less as the loans would be transformed into deposits. However, if FX loans are used for import payments, there will be no increase in deposits, so the LDR of the marginal lending will be infinite.

Figure 1 illustrates how the financing of an import payment (CA deficit) funded by domestic banking sector's borrowing from abroad affects the sector's balance sheet (red arrows). As indicated by the figure, FX liquidity obtained from abroad ends up in foreign exporters' accounts held abroad. Domestic banks' loan book increase by the same amount as the foreign borrowing. Resulting changes in sector's balance sheet unambiguously increases the LDR of the sector. This is very different than the case of banking sector creating domestic currency loans, whereby loans and deposits would grow at around the same rate.

Figure 1: Import payment financed by domestic bank FC credit



3.2. *The effect of CAD on LDR in a Dynamic Context*

In this section, we explore the relation between CA deficits, domestic banks' borrowings from abroad and LDR in a dynamic context. To this end, by using a simple dynamic model calibrated to Turkish data, we present how the LDR dynamics are shaped.

Our model consists of three equations, describing output growth, credit dynamics, and balance sheet constraint of the banking sector. The first equation specifies a constant (β) growth rate for the nominal output (Y_t), which is equal to the average growth rate of the period of interest. The second equation defines credit (L) dynamics, such that net credit (ΔL) as a percentage of nominal output is constant (μ). The last equation reflects banks' balance sheet constraint; net increase in credit is matched by the sum of net increase in deposits, ΔD_t, and net borrowing from abroad, $\theta\sigma Y_t$. Net borrowing from abroad by banks is assumed to be a constant fraction (θ) of CA deficit, which itself is proportional to nominal output (σY_t).[29,30]

[28] The total amount of FX loan and deposits that is to be created will depend on regulations on FX liquidity (e.g., reserve requirement ratio) and/or banks' own policies about FX liquidity

[29] Other factors like regulatory capital, reserve requirements, changes in banks' government bond holdings have also been affecting LDR. However, during the period on which we focus, the role of these factors on the LDR dynamics was limited.

[30] Relating banks' external borrowing to CA deficit seems like ignoring the importance of the distinction between gross vs net flows. However, for most emerging and developing economies, including Turkey, net flows almost coincide with gross flows.

$$Y_t = \beta Y_{t-1} \qquad \textbf{(Equation 1)}$$

$$\Delta L_t / Y_t = \mu \qquad \textbf{(Equation 2)}$$

$$\Delta L_t = \Delta D_t + \theta\sigma Y_t \qquad \textbf{(Equation 3)}$$

The simplifications imposed concerning the output growth (Equation 1), credit supply (Equation 2) and banks' borrowing from abroad will not affect the representativeness of the model significantly, if those variables display a mean reverting pattern without having any discernable trend, which indeed is the case (see Graph A1-A4 in Appendix 2).

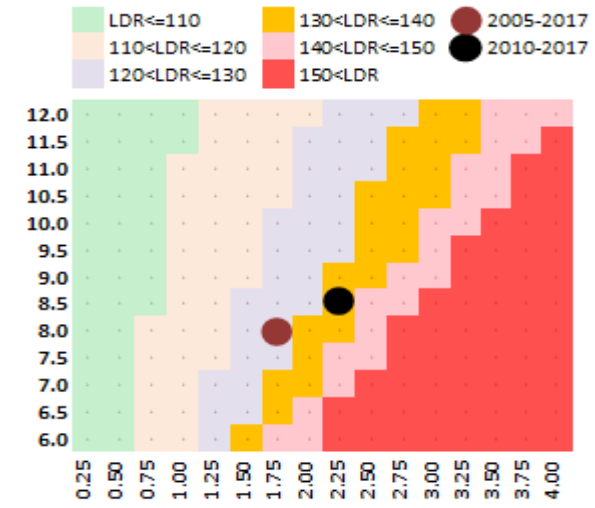
The first implication of the dynamic system is the existence of a stable steady state level for LDR, as well as the ratio of loans and deposits to GDP. The steady state value of LDR is:

$$LDR^{ss} = \mu/(\mu - \theta\sigma) \qquad \textbf{(Equation 4)}$$

The equation implies that the steady state value of LDR depends on net credit flows-to-GDP ratio (μ) and banks' borrowing from abroad as a percentage of national income (θσ). Using the parameter values obtained from the 2005-2017 period, we calculate the long-run value of LDR as 130 percent. That is, if the banks' borrowing from abroad as a share of GDP and the increase in net credit to GDP remain close to the average values of the 2005-2017 period, LDR would converge to 130 percent whereas if one calibrates the model to the 2010-2017 average, LDR would be around 10 percentage point higher (Graph 7a).

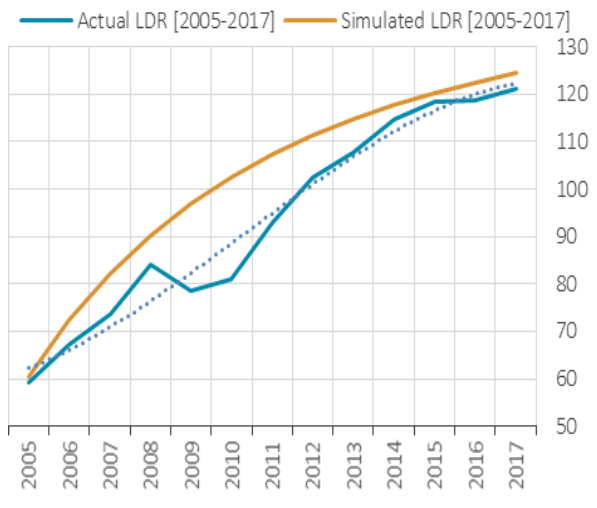
Depending on its initial position, the dynamic system also implies a path for LDR. To assess the performance of the dynamic aspect of the system, we derive the time path implied by the calibration configuration based again on 2005-2017 period averages. Graph 7b shows the simulated and the actual paths together (and a nonlinear trend for the latter). The simulated path mimics the actual path reasonably well. As the calibrations reflect the historical averages, the simulated paths do not capture the fluctuations around the trend.

Graph 7a: Steady State Values of LDR with Different Net Credit and Banks' Foreign Borrowing to GDP Ratios



Source: Authors' Calculation
Note: x- and y-axis represent the banks' foreign borrowing-to-GDP (θσ) and net credit-to-GDP (μ) ratios in percentages, respectively.

Graph 7b: Actual and Simulated LDR
(Percent)



Source: Authors' Calculation Latest Data:2018

In conclusion, in the presence of large CA deficits, external funding raised by domestic banks and funneled into domestic economy is drained quickly, leading to a rapid rise in the LDR of banking sector. Although, the dynamic system implies that LDR converges to a stable steady state, that is, the rise in LDR will stop at some point, this level can be too high for the investors (lending to the domestic banks) or the regulators. Therefore, at some point, banks can see sharp rises in cost of borrowing from abroad or face regulatory restrictions.

4. Data Set and Methodology

In this section, we present the results of the econometric analyses conducted to test our hypotheses with regards to the effect of LDR on deposit and loan rates. For deposit rates, we use monthly bank level data spanning September 2014- December 2017. Our main hypothesis is that a high level of LDR signals a deterioration in banks' funding quality (and thus the perceptions about the banks' financial soundness) and urges banks to offer higher returns to depositors. To test this hypothesis, we regress deposit rates on LDRs of banks while using a rich set of macroeconomic and bank level controls. Our main hypothesis has also several predictions that could be tested econometrically. For instance, we expect the effect of LDR on deposit rates to get stronger as the ratio increases. Another prediction of our hypothesis is the existence of a differential effect of the increase in LDR on different deposit types depending on the stickiness of the respective deposit type. Specifically, we expect to see the coefficient of LDR to be higher or more significant for saving deposit rates compared to commercial deposits rates, as the latter is relatively less stable. Similarly, deteriorating funding quality should increase demand for small ticket deposits than large ticket deposits, as the former known to be relatively stickier.[31] According to the results, these hypotheses cannot be rejected.

We use fixed effects panel data regressions for our analysis employing monthly data of 21 deposit banks (which represent around 95% of total sector assets) covering September 2014-December 2017 period. In order to avoid, possible endogeneity problems, we use lagged values of bank level explanatory variables. The following model was used to analyze the effects of the development of banks' liquidity ratios on the TL deposit rates:

$$Deposit_{b,t} = \beta_0 + \beta_1(LDR)_{b,t-1} + \beta_2(LCR)_{b,t-1} + \beta_3(Bank)_{b,t-1} + \beta_4(Macro)_{t-1} + \gamma_b + \theta_t + \boldsymbol{\varepsilon}_{b,t}$$

(Model 1)

$Deposit_{b,t}$ is bank b's deposit rate at time t, $(LDR)_{b,t-1}$ is bank b's loan-to-deposit ratio at time t-1, $(LCR)_{b,t-1}$ is bank b's liquidity coverage ratio, (a regulatory measure if short term liquidity) at time t-1. $(Bank)_{b,t-1}$ is the balance sheet ratios of bank b at time t-1. Bank level controls are real asset size, loan to assets ratio, deposit to assets ratio, the ratio of capital and liquid assets to total assets, non-performing loans ratio and return on assets ratio all available at monthly frequency. $(Macro)_{t-1}$ is the macroeconomic indicators for Turkish economy at time t-1 that enable us to control for the business cycles and monetary policy stance in Turkey. In addition, this allows us to better isolate the effects of LDR on deposit rates from other changes in economic activity or monetary conditions. At the macro level, we use data on industrial production index as an indicator of economic activity, inflation rate, reel effective exchange rate and BIST O/N repo rate, all on a monthly frequency.[32] γ_i is bank b's fixed effects, θ_t represents fixed effects for year or year-month of time t. Since the year-month fixed

[31] As a matter of fact, Net Stable Funding Ratio regulation proposed by BIS also distinguishes deposits with regards to their stickiness.

[32] The detailed definitions of the variables, data sources, and summary statistics are given in Table 1.

effects capture both the macro variables and any unobservable variables that vary at the country level, macro variables ($(Macro)_{t-1}$) will omit in columns where the year-month fixed effects are included.

For the loan rates, we use loan level data, which allow us to see banks' reactions at a more granular level. Unlike deposit rates, we did not have strong priors on how banks may react to the growing gap in between deposits and loans. We presume that banks would try to limit the growth rate of their loan books and also pass through at least part of the increase in cost of deposits to loan rates. The degree of pass-through would depend on how much banks want to slow down loan volumes and the elasticity of demand to loan rates. For more competitive loan segments, one would expect to see smaller changes in loan rates. Moreover, banks might also differentiate their price and quantity policies with respect to riskiness of the borrowers.

We estimate the following model to understand to what extent LDR's effect on deposit rates is reflected on loan rates.

$$Loan_{b,f,i,s,c,t} = \beta_0 + \beta_1(LDR)_{b,t-1} + \beta_2(LCR)_{b,t-1} + \beta_3(Bank)_{b,t-1} + \beta_4(Macro)_{t-1} + \beta_5(Bank\_Firm)_{b,f,i,s,c,t-1} + \alpha_b + \eta_f + \gamma_i + \zeta_s + \mu_c + \theta_t + \boldsymbol{\varepsilon}_{b,f,i,s,c,t} \quad \textbf{(Model 2)}$$

where the dependent variable $Loan_{b,f,i,s,c,t}$ is the interest rate or the natural logarithmic value of the amount of the bank b's loan (currency type of c) given to firm f operating in the sector s and city *i* at time t.[33] $(Bank\_Firm)_{b,f,i,s,c,t-1}$ represents the relationship strength between bank b and firm f and the internal evaluation grade/riskiness of firm f at time t-1. η_f is fixed effects for firm f, γ_i is fixed effects for city *i*, ζ_s is fixed effects for sector s, μ_c is fixed effects for currency type c, and θ_t represents fixed effects for year-month of time t. Moreover, we add firm*year-month fixed effects combinations ($\eta_{f,t}$) to control demand side effects and focus on the loans granted by banks having different loan-to-deposit ratios to same firm in the same month. While the macro variables ($(Macro)_{t-1}$) will omit in columns where the year-month fixed effects (θ_t) are included, firm fixed effects (η_f) and macro variables $(Macro)_{t-1}$ will omit in columns where firm*year-month fixed effects ($\eta_{f,t}$) are included.

Then, we investigate whether the impact of LDR on loan market is affected by the strength of bank-firm relationship and riskiness of firms. First, we examine whether the effects of LDR on the loan market change depends on the depth and duration of the relationship between the bank and the firm. Related literature indicates that the strength of bank-firm relationship may affect the amount and cost of loans. Therefore, this relationship may also play a role on how banks reflect the rise LDR on loan rates. To test this, we focus on the difference between firms that work with the same bank but have varying degrees of relationship depth. Therefore, we add bank*year-month fixed effects to our model:

$$Loan_{b,f,i,s,c,t} = \beta_0 + \beta_1(LDR)_{b,t-1} + \beta_2(LDR * Bank\_Firm)_{b,f,i,s,t-1} + \beta_3(Bank)_{b,t-1} + \beta_4(Macro)_{t-1} + \beta_5(Bank\_Firm)_{b,f,i,s,c,t-1} + \alpha_{b,t} + \eta_{f,t} + \gamma_i + \zeta_s + \mu_c + \theta_t + \boldsymbol{\varepsilon}_{b,f,i,s,c,t} \quad \textbf{(Model 3)}$$

Second, in order to explore the effects of raising LDR pressures on banks' risk taking attitudes, we include the interaction of loan riskiness and bank LDR in the set of explanatory variables. Again, we run the regressions for both loan amounts and loan rates. The macro variables will omit in columns where the year-month fixed effects are included. Moreover, while the macro and bank-specific variables is omitted in columns where the bank*year-month fixed effects are included, firm fixed effects and macro variables is omitted in columns where firm*year-month fixed effects are included.

[33] Some firms operate in different sectors at the same time and borrow loans from banks in different cities within the same month. We prefer to keep the city and sector dimensions to utilize this variation.

In 2017, we observed rapid loan growth and increased funding pressure due to the Credit Guarantee Fund (CGF) policy. Also, this period partially coincides with the period in which the downward rigidity in TL deposit rates occurred. By using difference-in-difference technique before and after the CGF policy, we examine whether the LDR has an additional effect on both deposit and CGF loan rates during the policy period. For this purpose, we have created an indicator that represents the share of banks' loans under CGF scheme in their total commercial loans ($(CGFRatio)_{b,t-1}$). Later, we included the interaction of this metric with LDR in the model. We also focus on supply-side factors by adding firm*year-month fixed effects to our model. The coefficient of the interactive variable gives marginal differences between banks that are more or less exposed to the CGF program in terms of the effect of LDR on deposit and loan rates.

$$CGF_{b,f,i,s,c,t} = \beta_0 + \beta_1(LDR)_{b,t-1} + \beta_2(LDR * CGFRatio)_{b,t-1} + \beta_3(CGFRatio)_{b,t-1} + \beta_4(Bank)_{b,t-1} + \beta_5(Macro)_{t-1} + \alpha_b + \eta_{f,t} + \gamma_i + \zeta_s + \mu_c + \theta_t + \boldsymbol{\varepsilon}_{b,f,i,s,c,t}$$ **(Model 4)**

where the dependent variable $CGF_{b,f,i,s,c,t}$ is the interest rate of the bank b's flow CGF loans given to firm f operating in the sector s and city *i* at time t. Then, we use the following model to focus on compositional effects:

$$Loan_{b,k,i,t} = \beta_0 + \beta_1(LDR)_{b,t-1} + \beta_4(Bank)_{b,t-1} + \beta_5(Macro)_{t-1} + \alpha_b + \gamma_{i,t} + \theta_t + \boldsymbol{\varepsilon}_{b,k,i,t}$$ **(Model 5)**

where $Loan_{b,k,i,t}$ is the interest rate of mortgage loans granted by bank b in city *i* to individual *k* at time t. Moreover, we use city*year-month fixed effect combinations to control the demand side effects.

5. Econometric Results:

5.1 Deposit Rates

Our main hypothesis is that higher LDRs urge banks to improve their funding mix and thus lead them to offer higher rates to deposits. Relatedly, if banks are striving for stable funding, we conjecture that they should also discriminate between the deposit types with regards to their stability. Hence, in the face of a persistent rise in LDR, we expect banks to offer higher rates to deposits and prioritize saving deposits over commercial deposits, as the former is more stable and stickier. To check the validity of these hypothesis, we regress the two types of deposit rates on LDR, together with a wide range of bank specific variables, macroeconomic control variables and bank and time fixed effects. Estimation output presented in Table A1.1 indicates that LDR is, in fact, positively related with both saving (columns from 1 to 4) and commercial deposit rates (columns from 5 to 8), supporting our main hypothesis. Specifically, a 10-percentage point increase in LDR brings about a 20-30 bps increase in deposit rates.

As for the second hypothesis, results present a vaguer picture; while the coefficient of LDR is higher in commercial deposit regression, it is not significantly larger than the coefficient from the savings deposit regression. On the other side, the significance level of the LDR coefficient in the savings deposit regression (at 1%) is higher than that of the commercial deposits (varying from 5% to 10%). To provide an alternative and a clearer way of comparison, we ran an additional estimation in which dependent variable includes both types of deposit rates. On the right-hand side, we interact LDR with a dummy

variable which indicates the type of the deposit. Results suggest that savings deposit rates are more sensitive to LDR (Table A1.2).

Another noteworthy result from the above estimations is the role of short-term liquidity position of banks (measured by regulatory ratio LCR, second variable from the top) on deposit rates. We found the effect of short-term liquidity on saving deposits insignificant. However, the results suggest a significant and negative relation between LCR and commercial deposit rates, meaning that a deterioration in short-term liquidity position is causing a rise in commercial deposit rates. Overall, Turkish banks do not experience a systemic problem in fulfilling the LCR regulation. However, at bank level, liquidity coverage ratios display some volatility, implying that some banks might occasionally have faced adverse shocks. Therefore, when banks suffer from a short-term liquidity problem, (which could push their LCR below regulatory thresholds), to meet the liquidity shortage, they are likely to try to attract commercial deposits, particularly large ticket ones, which are more sensitive to interest rates.

We designed an additional estimation to investigate the second hypothesis above, that is, higher LDRs increase the demand for sticky deposits more. In this regression (presented in Table A1.3), we separated both savings and commercial deposits into two groups: small- and large-scale deposits. Small scale deposits are commonly assumed to be more stable, particularly for saving deposits. Large ticket deposits are known to be more sensitive to the interest rates and may display significant volatility. [34] Therefore, they might be easier to attract by offering higher rates but also easier to lose to the other banks (Alper et al, 2011). Similar to our hypothesis regarding commercial and saving deposits, to keep LDR under control, we expect banks to resort more to stable type of deposits. The results support our hypothesis; concerning saving deposits, high LDR levels are associated with higher rates on small and large ticket deposits, however, the effect is stronger for small ticket deposits. As for the commercial deposits, estimations present rather a conflicting result, as they suggest that the effect of LDR on large ticket deposits are stronger. One possible explanation could be that the deposit preferences of small businesses are driven almost entirely by the cash flows of the respective companies, hence, they are insensitive to interest rates.

Can the relation between LDR and deposit rate be non-linear?

In the previous estimations, we assumed that the relation between LDR and deposit rates is linear. However, it stands to reason that LDR becomes more relevant for deposit rate decisions when it is higher. We utilized two different approaches to test this hypothesis. First, we run the same regressions for two different periods: April 2011 - August 2014, where LDRs were relatively lower and September 2014 - December 2017 during which LDR saw its historical highs. In line with our hypothesis, the results presented in Table A2.1 indicate that LDR comes out significant only in the latter period, both for savings and commercial deposits. In the second approach, we distinguished between the levels of LDR in the same regression by using dummies. To this end, we have created three bins for LDR values: "below 110", "110-120" and "above 120". The results clearly corroborate to our hypothesis (Table A2.2); that is, LDR starts to pressurize banks at or above 120 levels. In other words, it starts to urge banks to attract more deposits by offering higher rates after the ratio increases past 120.

[34] For instance, Federal Deposit Insurance Corporation (FDIC) distinguishes between small deposits and large and brokered deposits (FDIC, 2011). FDIC definition of core deposits only includes deposits under $250,000 (minus all brokered deposits under $250,000). See also Khan (2011), who higlights the importance of core deposits, which consist in small scale retail deposits, for financial intermediaries in emerging and developing countries.

5.2. Loan Rates

In the second set of estimations, we investigate the role of LDR on commercial loan rates by using loan level data. It stands to reason that banks pass at least a part of the increase in deposit rates to loan rates. Besides, independent of deposit rates, banks may want to increase loan rates to slow down the loan growth rates. As discussed above, the increase in loan rates will depend on the degree of competitiveness in the respective loan (segments) market. Theoretically, if loan market is perfectly competitive, individual banks will not have room to increase loan rates above market rates.[35] In this case, a bank would be able to charge higher rates only by moving along risk-return tradeoff curve, that is, by opting for riskier clients. Of course, if the loan market functions efficiently, changing the risk profile of customers should not change the expected return of the loan portfolio. However, for the loan segments or clients where banks enjoy some degree of pricing power, banks might be able to (partially or entirely) transfer the increase in their funding costs to borrowers.

The following set of estimations focus on abovementioned hypotheses. First, we have commercial loan rates and loan amounts as dependent variables to see whether LDR affects the loan rates and amounts (Table B1). In the first three estimations presented in Table B1, (columns 1 to 3), dependent variables are loan rate, whereas in the remaining three (columns 3 to 6) dependent variable are loan volumes (monthly flows). In both group of estimation, first, we start by using only LDR and fixed effects (e.g. bank, firm, sector) as explanatory variables, then, we add bank and firm specific variables (columns 2 and 5). Finally, in columns 3 and 6, we add firm*year-month fixed effects combinations that is, we only consider the loans granted by different banks to the same firms in the same month. In other words, we restrict our sample to the firms that are concurrently borrowing credit from at least two banks, and thus control for the demand side factors to identify the effects of LDR on commercial loans.

The results show that LDR is positively associated with loan rates, with the respective coefficients being significant at 1% level for all regressions. Furthermore, as the initial regression is saturated with additional control variables, the coefficient of LDR gets even larger. According to our findings, the effect of LDR on loan rates are much stronger. Specifically, a 10-percentage point increase in LDR result in at around 400 bps increase in loan rates, which implies that banks raised loan rates beyond the increase in the cost of deposits.

The aim of testing the effect of LDR on loan volumes is to check whether high LDRs have ultimately affected loan amounts. This could have happened due to the increase in loan rates and/or tightening of lending standards, however, with the current setting we cannot distinguish the underlying reason. The results presented in columns 4 to 6 in Table B1, confirm that LDR had a negative effect on loan volumes. The regression presented in column 6, for instance, indicates that among the banks lending to same firm, ones with higher LDR provides less credit or ones who have seen their LDRs growing in the previous periods more started to lend less.

Effects of LDR when banks have pricing power

[35] Unless all banks are in the same situation.

To investigate whether banks would increase loan rates more for the clients over whom they have relatively higher market power, we introduce relationship banking as an explanatory variable.[36] The literature suggests that the depth and duration of the relationship between the lender and the borrower can be decisive on loan rates and amounts. According to the theory (Berger and Udell, 1992; Petersen and Rajan, 1994; Sette and Gobbi, 2015; Banerjee et al, 2017), firms with a longer relationship with a bank (whereby bank obtains an informational advantage over other banks) cannot easily shift to other banks, which provides respective banks a certain degree of pricing power over those clients.

To test this hypothesis, we used the same set-up in Table B1, but introduced relationship variable and its interaction with the LDR variable. The estimation results in Table B2 support our hypothesis as the interaction terms comes out positive at 1% significance level. Verbally, for firms working exclusively with a certain bank, a rise in LDR of lender banks, brings about a higher increase in loan rates granted to those firms. However, note that the additional increases in loan rates owing to relationship banking are not very large compared to average increase in loan rates resulting from an increase in LDR.

Effects of LDR when banks have no or limited pricing power

As an alternative way of checking how the intensity of competition or pricing power of banks change the effect of LDR on banks' loan pricing decision, we focus on the rates in one of the most competitive loan segments, namely, housing loans. Among others, two factors make the housing markets in Türkiye very competitive: (1) a very strenuous loan to value regulation (regulatory minimum is at 75%), which reduces the credit risk substantially, (2) borrowers' high attentiveness to the market rates, which is due to the fact that mortgage loans are large and have long tenures, which makes the interest service of these loans much higher relative to borrowers' incomes. In other words, should the banks implement a higher interest rate than the market average, they might lose all their market share. Therefore, banks have less room in this segment to deviate from the rates applied by other banks (Alper et al, 2011).

We used two different regression set-ups to examine the effect of LDR on housing loans. First, together with bank specific variables and a rich set of fixed effects (bank, city, time and City-month), we tested the effect of LDR on housing loan rates. The results indicate that LDR is positively related to mortgage rates (Table B3.1), however, the coefficient of LDR is significantly lower compared to the commercial loan rate regressions; 0.003 (Table B3.1 column 4) vs 0.397 (Table B1, column 3)). Also noteworthy is the fact that the reaction of housing loan rates to LDR is even more muted that that of deposit rates. In this case, we expect banks to adjust their lending volumes significantly. To see whether this actually is the case we run the ratio of volumes of mortgage and commercial loans on LDR and other set of controls used in the previous regression. The results indicate that indeed, banks with higher LDR have seen larger declines in their mortgage portfolio relative to the volume of commercial loans.

Did higher LDRs increase risk taking?

Previous results suggest that banks with higher LDRs increased deposit rates and saw a slowdown in their loan volumes. Therefore, higher LDRs is likely to have negative consequences on banks' profitability. In an attempt to compensate for this, banks may have opted for more risky loans. Although, if, in the loan market, credit risk is being properly assessed and priced in, lending to riskier

[36] See Table 1 for the construction of relationship banking variable. Appendix 3 presents alternative definitions for relationship banking. The regression results with alternative definitions are presented in Table A3.1a and Table A3.1b. Our main conclusions continue to hold for alternative definitions, as well

firms would not increase the long run expected return of a loan portfolio. However, banks may still be tempted to boost the interest rate margins in the short run.

To see whether this was the case, we check first, whether the banks with higher LDR increased the loan rates for risky clients less than other banks and second whether these banks increased the amount of risky loans more compared to the banks with lower LDRs.[37] To this end, for the loan rate regression, we used the same set up as in Table B2, but replaced relationship banking variables with a variable representing the riskiness of loans. We find that the interaction term (LDR-riskiness of the loan) is statistically significant and positive (Table B4, columns 1 to 3), which imply that banks with higher LDR increased the loan rates for risky borrowers more.

The results from the loan amount regressions (Table B4, columns 4 to 6) suggest that as LDR raises banks tend to reduce the amount of risky loans more. However, note that we do not make a claim on the possible sources of lower lending by high LDR banks, that is, it could be due to the higher loan rates implemented by these banks to risky clients and/or due to tightening of credit standards. All in all, instead of relying more on risky loans to preserve their interest margins, banks with high LDRs try to decrease the volume of risky loans volumes through charging higher rates and possibly also by rejecting or discouraging those type of loans through other means.

The finding that banks with high LDR take an even more risk averse stance is intriguing. Unfortunately, our estimations do not provide a direct answer to the possible reasons for this observation. However, the estimations regarding housing loans allow us to suggest a tentative explanation. The results from the said regressions show that banks with high LDRs declined their housing loans more than the commercial loans. As housing loans are significantly less risky, ceteris paribus, a decrease in their share means the risk of overall loan portfolio increased. To compensate for these banks might have tried to reduce risky loans in the commercial loan portfolio.

How did LDR affect banks' response to a loan demand shock: A Boost to Credit Guarantee Fund

In the beginning of 2017, to prop up the ailing domestic demand following the failed coup-d'état in July 2016, the government boosted the capacity of credit guarantee fund (CGF) by 13-fold. After the government support, the amount of credit that the fund can potentially back reached 15% of the then the total volume of outstanding loans. Firms' use of the facility picked up steeply in March 2017. As both firms and banks wanted to benefit from the opportunity, the credit growth rate skyrocketed within a short period. However, as LDR was already high this would mean further demand on deposits especially for the high LDR banks. To test whether banks with higher LDR and started to lend more through CGF had to increase the deposit rates more, we include an interaction term, which is simply the multiplication of LDR and the banks' engagement in CGF supported loans, where the latter term is defined as the ratio of CGF loans to total commercial loans. Higher the value of interaction term, higher the LDR of a bank for a given level of CGF backed lending or vice versa. A positive coefficient implies that banks with higher LDRs and willingness to benefit from positive loan demand shock had to offer even higher rates to depositors. The results corroborate the conjecture that banks with high LDR and increased lending through CGF had to increase deposit rates more. Like previous results, banks raised the saving deposits rates more strongly than they did commercial deposit rates.

[37] See Table 1 for the construction of riskiness variable. Appendix 3 presents alternative definitions for riskiness and run the same regressions (Table A3.2a and Table A3.2b) with alternative definitions. Our main conclusions continue to hold for alternative definitions, as well.

6. Conclusion

This study documents the implications of a deteriorating funding quality on deposits rates and lending decision of banks in Turkish economy during 2015-2016 period, where loan-to-deposit ratios, a widely used indicator for funding quality, rose to historically high levels. In addition to documenting the econometric results of this investigation, we propose an explanation for how system wide sustained increase in LDR were related to macroeconomic conditions. In this context, we claim that persistent rise in LDR of Turkish banking system was caused by banks' borrowing from abroad and the large CA deficits which drained the FX liquidity quickly from the financial system, thus not allowing it going back to the domestic banking system as deposit.

Econometric analyses at bank level data show that higher loan-to-deposit ratios prompted banks to attract more deposits and led to a rise in deposit rates. Furthermore, as our hypothesis predicts, the results suggests that among the different type of deposits, banks preferred the more stable or stickier types. Specifically, the statistical significance of LDR coefficient is much higher (mostly at 1% level) on saving deposits compared to commercial deposits (mostly at 10%). Similarly, while coefficient of LDR for small and large deposits are not statistically different, coefficients of LDR for small ticket deposits are statistically more significant.

By using loan level data, we also investigate whether or how banks adjusted their loans in response to raising LDR. Unlike deposits, banks have more options in managing loan volumes; they can rise lending rates or reject or discourage firms by tightening loan standards. Moreover, they can differentiate their policies across different type of loans and clients depending on the riskiness of the loan, market power at different loan types, or the relations with the clients.

First, we find that banks with higher LDR increased their lending rates. Moreover, the sensitivity of loan rates to LDR are found to be much stronger than that of deposit rates, which means that the rise in loan rates cannot be due only to the rise in deposit rates. In other words, high LDRs also led banks to slowdown loan growth. Indeed, our findings that show a negative association between loan growth and high LDR also corroborates this interpretation. As one would expect, our results suggest that the loan rates increased more in more competitive market segments or for clients where banks have more room to exercise market power. For instance, interest rates on housing loans found to be very insensitive to the LDRs. On the other hand, banks pressured by high LDRs were found to have increased the lending rates more for captive clients, which exclusively works with one bank. One choice that might banks opt for when funding costs rise is to increase the share of risky loans, which in the short run can help banks preserve their interest margins. Our results show, however, that banks faced with increasing loan-deposit gap are inclined to damp riskier loans or clients. In other words, pressure from deteriorating funding mix and rising costs did not lead to more risk raking by banks.

The results of this study are of interest for several strands of literature. By detecting a variable that affects the determination of retail rates, i.e., funding quality, and by documenting how banks react to pressures on funding quality, the paper contributes to the empirical literature on microeconomics of banking. Relatedly, the findings of the paper are also of relevance for interest rate pass-through literature, as the paper documents that the , worsening of the funding quality might cause sustained and significant deviations from the policy or market rates. Last but not least, our analysis contributes to the growing macrofinancial literature by documenting how monetary policy transmission mechanism might be crippled due to the changes in banking sector funding composition, which, in turn, may be related to the macroeconomic conditions.

Findings of the paper has also important policy implications for monetary and macro prudential policy interaction. If macro prudential policies cannot prevent the deterioration in banks' funding quality, effectiveness of monetary policy might weaken considerably. On the other hand, regulations targeting banking system's funding mix should also take the role of macroeconomic structure into account; too tight and abrupt regulatory thresholds might create undesirably high strains on financial intermediators, which, in turn, might have adverse spillovers on real economy.

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Table1: Summary Statistics

Variable Names	Definition	Source	Period	N	Mean	SD	Min.	0.25	0.5	0.75	Max.
Dependent Variables											
Saving Deposit Rate	The interest rate of saving deposits	CBRT	2014M09-2017M12	837	11.0	2.0	5.1	9.9	10.9	12.1	15.5
Commercial Deposit Rate	The interest rate of commercial deposits	CBRT	2014M09-2017M12	840	10.8	1.7	7.1	9.6	10.6	11.9	15.2
Interest Rate of Commercial Loans	The interest rate of flow commercial loans	CBRT	2014M09-2017M12	10,515,239	15.2	6.3	0.0	12.2	15.5	18.1	225.0
Amount of Commercial Loans	The natural logarithm of the amount of flow commercial loans	CBRT	2014M09-2017M12	11,874,896	3.7	1.6	0.0	2.7	3.7	4.6	15.1
Interest Rate of CGF Loans	The interest rate of flow CGF (Credit Guarantee Fund) loans	CBRT	2014M09-2017M12	614,784	8.9	7.4	0.0	0.0	11.1	15.1	60.0
Independent Variables											
LTD	Loan-to-deposit ratio	CBRT	2014M09-2017M12	840	117.1	21.4	55.6	107.2	118.2	125.2	225.0
LCR	Liquidity coverage ratio	CBRT	2014M09-2017M12	720	117.2	59.1	60.6	88.3	102.3	121.6	489.7
Turkey (TR) Macro Variables											
GDP	Yearly change in industrial production index (used instead of GDP)	TurkStat	2014M09-2017M12	40	6.2	6.8	-8.6	3.1	6.1	8.1	29.3
Inflation Rate	Yearly change in consumer price index (CPI)	TurkStat	2014M09-2017M12	40	8.8	1.7	6.6	7.5	8.4	9.7	13.0
REER	Monthly change in real effective exchange rate based on CPI	CBRT	2014M09-2017M12	40	-0.5	2.3	-4.6	-2.2	-0.3	1.0	5.0
BIST Repo Rate	Borsa Istanbul over/night repo rate	CBRT	2014M09-2017M12	40	10.4	1.2	8.2	9.5	10.7	10.8	12.3
Bank-Specific Variables											
Total Assets	The natural logarithm of banks' total real assets	CBRT	2014M09-2017M12	840	12.1	1.4	9.4	10.7	12.0	13.6	14.1
Credit Ratio	Total loans divided by total assets	CBRT	2014M09-2017M12	840	0.6	0.1	0.3	0.6	0.6	0.7	0.8
Deposit Ratio	Total deposits divided by total assets	CBRT	2014M09-2017M12	840	0.6	0.1	0.2	0.5	0.6	0.6	0.8
NPL Ratio	Bank non-performing loans divided by bank total loans	CBRT	2014M09-2017M12	840	0.0	0.0	0.0	0.0	0.0	0.0	0.1
ROA Ratio	Bank net profit divided by total assets	CBRT	2014M09-2017M12	840	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital Ratio	Capital divided by total assets	CBRT	2014M09-2017M12	840	0.1	0.0	0.0	0.1	0.1	0.1	0.2
Liquidity Ratio	Selected FX liquid assets (cash + foreign banks(free) + free Eurobonds) divided by total assets	CBRT	2014M09-2017M12	840	0.1	0.0	0.0	0.0	0.1	0.1	0.2
FX Noncore Ratio	Selected FX noncore liabilities divided by total liabilities	CBRT	2014M09-2017M12	840	0.2	0.1	0.0	0.1	0.2	0.2	0.6
Bank-Firm Variables											
RelationshipRatio	The ratio of loans a firm obtains from a particular bank to the total loans the firm obtains from all banks from 2002 up to time t.	CBRT	2014M09-2017M12	11,874,896	0.5	0.4	0.0	0.2	0.5	1.0	1.0
RelationshipRatio2	The natural logarithm of the duration (month) between the first relation and observation dates	CBRT	2014M09-2017M12	11,874,896	2.8	1.6	0.0	1.8	3.3	4.0	5.2
RelationshipRatio3	The natural logarithmic value of the (RelationshipRatio*Duration)	CBRT	2014M09-2017M12	11,874,896	1.9	1.7	-12.2	0.1	2.2	3.3	5.2
Riskiness	1/ (duration (month) between the last date of a firm has a nonperforming loan and the observation date)	CBRT	2014M09-2017M12	11,874,896	0.0	0.1	0.0	0.0	0.0	0.0	1.0
Riskiness2	Dummy variable that indicates whether a specific firm defaults within last 3 years	CBRT	2014M09-2017M12	11,874,896	0.0	0.2	0.0	0.0	0.0	0.0	1.0
Riskines3	Internal rating of banks on borrower firms	CBRT	2014M09-2017M12	6,517,444	2.5	1.1	1.0	2.0	2.0	3.0	5.0
Other Variables											
Share1	The ratio of TL deposits less than 1 million to total TL saving deposits	CBRT	2014M09-2017M12	840	73.4	15.5	31.6	64.9	76.0	82.8	100.0
Share2	The ratio of TL deposits less than 1 million to total TL commercial deposits	CBRT	2014M09-2017M12	840	20.1	11.7	2.5	11.1	18.1	26.1	63.3
CGF Ratio	Flow CGF loans divided by total commercial loans	CBRT	2016M01-2017M12	432	0.2	0.1	0.0	0.1	0.2	0.3	0.6

Table A1.1: The Effects of LDR and LCR on the *Deposit Rates*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:	**TL Saving Deposits Rate**				**TL Commercial Deposits Rate**			
LTD_{t-1}	0.002	0.015***	0.016***	0.019***	0.003	0.024*	0.025*	0.029**
	[0.002]	[0.005]	[0.004]	[0.004]	[0.005]	[0.012]	[0.013]	[0.011]
LCR_{t-1}	0.000	0.001	0.001	0.000	-0.002**	-0.002***	-0.002***	-0.003***
	[0.001]	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]	[0.001]	[0.001]
BIST Repo Rate_{t-1}	0.581***	0.570***	0.455***	-	0.701***	0.709***	0.593***	-
	[0.014]	[0.014]	[0.021]		[0.023]	[0.022]	[0.029]	
Total Assets_{t-1}		2.652***	2.644***	1.438***		2.456***	2.466***	1.152***
		[0.275]	[0.273]	[0.179]		[0.298]	[0.287]	[0.275]
Credit Ratio_{t-1}		-4.307***	-4.435***	-6.297***		-8.979***	-8.955***	-11.195***
		[1.428]	[1.388]	[1.108]		[2.688]	[2.850]	[2.376]
Deposit Ratio_{t-1}		8.275***	8.533***	10.083***		15.528***	15.637***	17.576***
		[1.684]	[1.600]	[1.239]		[3.006]	[3.118]	[2.656]
NPL Ratio_{t-1}		-2.377	-1.081	-10.317***		-2.527	-0.695	-9.874*
		[4.215]	[4.042]	[2.840]		[5.927]	[6.071]	[5.730]
ROA Ratio_{t-1}		-13.654**	-15.408**	2.727		13.902*	11.562	32.162***
		[6.692]	[6.443]	[4.204]		[8.165]	[7.994]	[6.409]
Capital Ratio_{t-1}		-0.943	0.183	1.934		3.533	4.858	6.235*
		[2.502]	[2.410]	[1.580]		[3.933]	[3.943]	[3.504]
Liquidity Ratio_{t-1}		-2.358*	-2.189*	-2.066***		-0.438	-0.143	-0.057
		[1.204]	[1.173]	[0.724]		[1.785]	[1.811]	[1.531]
FX Noncore Ratio_{t-1}		0.283	0.507	1.246**		4.847***	5.087***	5.956***
		[0.921]	[0.894]	[0.608]		[1.330]	[1.301]	[1.194]
GDP_{t-1}			0.014***	-			0.012***	-
			[0.003]				[0.004]	
Inflation Rate_{t-1}			0.144***	-			0.167***	-
			[0.021]				[0.029]	
REER_{t-1}			0.016	-			0.010	-
			[0.010]				[0.013]	
Constant	1.817***	-37.926***	-38.454***	-14.896***	0.358	-40.566***	-41.523***	-14.991***
	[0.271]	[3.953]	[3.933]	[2.638]	[0.538]	[4.479]	[4.382]	[4.331]
Bank-Specific Variables	No	Yes	Yes	Yes	No	Yes	Yes	Yes
TR Macro Variables	No	No	Yes	-	No	No	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time (Year) Fixed Effects	Yes	Yes	Yes	-	Yes	Yes	Yes	-
Time (Year-Month) Fixed Effects	No	No	No	Yes	No	No	No	Yes
R2	0.889	0.918	0.924	0.968	0.839	0.876	0.882	0.927
Number of Observations	720	720	720	720	720	720	720	720
Δ (bp) in the deposit rates with increase in the LDR by 10 points:	2	15	16	19	3	24	25	29

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate of TL saving and commercial deposits. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table A1.2: Marginal Difference Between Saving and Commercial Deposits

	(1)	(2)
Dependent Variable:	**Interest Rate**	
LTD_{t-1}	0.024***	0.027***
	[0.008]	[0.007]
Dummy*LTD_{t-1}	-0.006***	-0.006***
	[0.002]	[0.002]
Dummy {=0 for savings; =1 for commercial deposits}	0.391	0.391
	[0.285]	[0.256]
LCR_{t-1}	-0.001	-0.002***
	[0.001]	[0.001]
BIST Repo Rate_{t-1}	0.524***	-
	[0.027]	
Constant	-40.184***	-15.139***
	[4.615]	[4.712]
Bank-Specific Variables	Yes	Yes
TR Macro Variables	Yes	-
Bank Fixed Effects	Yes	Yes
Time (Year) Fixed Effects	Yes	-
Time (Year-Month) Fixed Effects	No	Yes
R2	0.797	0.840
Number of Observations	1,440	1,440

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate of TL deposits. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table A1.3: The Effects of LDR and LCR on the Deposit Rates *across Small and Large Deposits*

	(1)	(2)	(3)	(4)
Dependent Variable:	**TL Saving Deposits**		**TL Commercial Deposits**	
	Small Amount	**Large Amount**	**Small Amount**	**Large Amount**
LTD_{t-1}	0.021***	0.016***	0.016***	0.029**
	[0.005]	[0.004]	[0.006]	[0.012]
LCR_{t-1}	0.001	-0.001**	-0.002***	-0.003***
	[0.000]	[0.000]	[0.001]	[0.001]
Constant	-24.428***	-10.275***	-16.205***	-13.377***
	[3.248]	[2.602]	[4.335]	[4.793]
Bank-Specific Variables	Yes	Yes	Yes	Yes
TR Macro Variables	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	Yes	Yes
R2	0.938	0.976	0.917	0.923
Number of Observations	720	680	720	680

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate of TL saving and commercial deposits. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table A2.1: The Effects of LDR on *Deposit Rates*

	(1)	(2)	(3)	(4)
Dependent Variable:	**TL Saving Deposits**		**TL Commercial Deposits**	
Period:	**[2011M04-2014M08]**	**[2014M09-2017M12]**	**[2011M04-2014M08]**	**[2014M09-2017M12]**
LTD_{t-1}	0.000	0.019***	0.002	0.029**
	[0.008]	[0.004]	[0.009]	[0.011]
Constant	2.415	-14.896***	-7.620*	-14.991***
	[3.920]	[2.638]	[4.331]	[4.331]
Bank-Specific Variables	Yes	Yes	Yes	Yes
TR Macro Variables	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	Yes	Yes
R2	0.927	0.968	0.897	0.927
Number of Observations	814	720	818	720

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate of TL saving and commercial deposits. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table A2.3: The relation between the level and the effect of LDR on deposit rates

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	**TL Saving Deposits Rate**			**TL Commercial Deposits Rate**		
Period:	**[2014M09-2017M12]**					
Dummy1*LTD_{t-1}	-0.019	-0.009	-0.023**	-0.047***	-0.015	-0.028
	[0.013]	[0.015]	[0.010]	[0.013]	[0.025]	[0.021]
Dummy2*LTD_{t-1}	-0.005	-0.002	0.005	0.008	0.032	0.042**
	[0.008]	[0.012]	[0.009]	[0.013]	[0.022]	[0.020]
Dummy3*LTD_{t-1}	0.006**	0.011**	0.011***	0.010**	0.019	0.019
	[0.002]	[0.005]	[0.004]	[0.005]	[0.014]	[0.012]
Dummy1	3.031**	2.567*	3.793***	6.858***	4.143**	5.357***
	[1.407]	[1.341]	[0.908]	[1.594]	[1.713]	[1.393]
Dummy2	1.312	1.584	0.596	0.315	-1.370	-2.689*
	[1.076]	[1.136]	[0.769]	[1.719]	[1.724]	[1.465]
Dummy4*LCR_{t-1}	-0.009**	-0.013***	-0.004**	-0.013**	-0.018***	-0.008*
	[0.004]	[0.004]	[0.002]	[0.006]	[0.007]	[0.005]
Dummy5*LCR_{t-1}	0.002*	0.000	0.000	-0.001	-0.003*	-0.004***
	[0.001]	[0.001]	[0.001]	[0.002]	[0.002]	[0.001]
Dummy6*LCR_{t-1}	0.000	0.001*	0.000	-0.002**	-0.001*	-0.003***
	[0.001]	[0.001]	[0.000]	[0.001]	[0.001]	[0.001]
Dummy4	0.666**	1.208***	0.243	0.792	1.476***	0.374
	[0.337]	[0.370]	[0.166]	[0.487]	[0.531]	[0.397]
Dummy5	-0.297**	0.057	-0.109	-0.193	0.195	-0.009
	[0.151]	[0.133]	[0.083]	[0.203]	[0.204]	[0.145]
Constant	1.105***	-40.004***	-14.853***	-1.143	-42.373***	-13.554***
	[0.382]	[3.773]	[2.803]	[0.721]	[4.543]	[4.584]
Bank-Specific Variables	No	Yes	Yes	No	Yes	Yes
TR Macro Variables	No	Yes	-	No	Yes	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time (Year) Fixed Effects	Yes	Yes	-	Yes	Yes	-
Time (Year-Month) Fixed Effects	No	No	Yes	No	No	Yes
R2	0.894	0.928	0.970	0.852	0.888	0.932
Number of Observations	720	720	720	720	720	720

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate of TL saving and commercial deposits. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects.

Table B1: The Effects of LDR on the *Interest Rate and Amount of Commercial Loans*

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	**Interest Rate**			**Amount**		
LTD_{t-1}	0.018***	0.435***	0.397***	-0.002***	-0.008***	-0.009***
	[0.000]	[0.005]	[0.005]	[0.000]	[0.001]	[0.001]
Constant	18.302***	79.814***	40.522***	4.209***	5.246***	6.251***
	[0.035]	[0.862]	[1.180]	[0.009]	[0.197]	[0.338]
Bank-Specific Variables	No	Yes	Yes	No	Yes	Yes
Bank-Firm Variables	No	Yes	Yes	No	Yes	Yes
TR Macro Variables	-	-	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	-	Yes	Yes	-
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	-	Yes	Yes	-
(Firm*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**No**	**No**	**Yes**
R2	0.663	0.669	0.769	0.617	0.618	0.730
Number of Observations	9,667,953	9,667,953	3,382,689	11,041,279	11,041,279	4,144,610

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate or natural logarithm of the amount of new commercial loans. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table B2: The Effects of LDR on the *Interest Rate* of Turkish Banks' New Domestic Lending across Different Bank-Firm Relationship Ratio

	(1)	(2)	(3)	(4)
Dependent Variable:	**Interest Rate**			
LTD_{t-1}	-0.001***	0.428***	0.389***	-
	[0.000]	[0.005]	[0.005]	
LTD_{t-1} * RelationshipRatio_{t-1}	0.011***	0.011***	0.006***	0.007***
	[0.000]	[0.000]	[0.000]	[0.000]
Relationship Ratio_{t-1}	-1.333***	-1.320***	-0.865***	-0.904***
	[0.012]	[0.012]	[0.018]	[0.010]
Constant	20.755***	78.644***	40.030***	21.067***
	[0.040]	[0.857]	[1.177]	[0.013]
Bank-Specific Variables	No	Yes	Yes	-
Bank-Firm Variables	No	Yes	Yes	Yes
TR Macro Variables	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	-
Firm Fixed Effects	Yes	Yes	-	Yes
City Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	-	-
(Firm*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**No**
(Bank*Year-Month) Fixed Effects	**No**	**No**	**No**	**Yes**
R2	0.664	0.670	0.769	0.711
Number of Observations	9,667,953	9,667,953	3,382,689	9,667,953

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate or natural logarithm of the amount of new commercial loans. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table B3.1: The Effects of LDR on Housing Loan Rates

	(1)	(2)	(3)	(4)
Dependent Variable:	**The Interest Rate of Housing Loans**			
LTD_{t-1}	0.008***	0.002***	0.003***	0.003***
	[0.000]	[0.001]	[0.001]	[0.001]
Constant	9.231***	46.399***	45.927***	45.927***
	[0.034]	[1.036]	[1.039]	[1.039]
Bank-Specific Variables	No	Yes	No	Yes
TR Macro Variables	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	-	-
Time (Year-Month) Fixed Effects	Yes	Yes	-	-
(City*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**Yes**
R2	0.771	0.800	0.802	0.802
Number of Observations	821,858	821,858	821,858	821,858

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate of housing loans. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table B3.2: The Effects of LDR on Housing Loan Volumes

	(1)	(2)	(3)	(4)
Dependent Variable:	**The Ratio of Housing Loans to Commercial Loans**			
LTD_{t-1}	-0.010***	-0.082***	-0.081***	-0.081***
	[0.003]	[0.019]	[0.019]	[0.019]
Constant	1.647***	15.665***	15.247***	15.247***
	[0.360]	[3.284]	[3.116]	[3.116]
Bank-Specific Variables	No	Yes	No	Yes
TR Macro Variables	-	-	-	-
City Fixed Effects	Yes	Yes	-	-
Time (Year-Month) Fixed Effects	Yes	Yes	-	-
(City*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**Yes**
R2	0.015	0.045	0.153	0.153
Number of Observations	26,053	26,053	26,049	26,049

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the ratio of housing loans to commercial loans. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table B4: The Effects of LDR on the *Interest Rate and Amount* of Turkish Banks' New Domestic Lending across Firms Having Different Riskiness Level

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	**Interest Rate**			**Amount**		
LTD_{t-1}	0.018***	0.435***	-	-0.002***	-0.008***	-
	[0.000]	[0.005]		[0.000]	[0.001]	
LTD_{t-1} * Riskiness_{t-1}	0.057***	0.044***	0.048***	-0.005***	-0.005***	-0.005***
	[0.004]	[0.004]	[0.003]	[0.001]	[0.001]	[0.001]
Riskiness_{t-1}	-4.892***	-3.254***	-3.682***	0.366***	0.272**	0.312***
	[0.433]	[0.475]	[0.401]	[0.119]	[0.118]	[0.118]
Constant	18.316***	79.830***	21.052***	4.207***	5.250***	3.881***
	[0.035]	[0.862]	[0.013]	[0.009]	[0.197]	[0.001]
Bank-Specific Variables	No	Yes	-	No	Yes	-
Bank-Firm Variables	No	Yes	Yes	No	Yes	Yes
TR Macro Variables	-	-	-	-	-	-
Bank Fixed Effects	Yes	Yes	-	Yes	Yes	-
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	-	Yes	Yes	-
(Bank*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**No**	**No**	**Yes**
R2	0.663	0.669	0.711	0.617	0.618	0.620
Number of Observations	9,667,953	9,667,953	9,667,953	11,041,279	11,041,279	11,041,279

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate or natural logarithm of the amount of new commercial loans. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table C1: The Effects of LDR on Deposits Rates and CGF Loans during CGF Policy Period

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	**Interest Rate of Deposits**					
	Saving Deposits			**Commercial Deposits**		
Window:	**6-Months**	**9-Months**	**12-Months**	**6-Months**	**9-Months**	**12-Months**
LTD_{t-1}	-0.001	0.003	0.053**	0.118*	0.090**	0.047*
	[0.033]	[0.025]	[0.025]	[0.067]	[0.044]	[0.026]
LTD_{t-1} * CGF Ratio_{t-1}	0.283***	0.176***	0.084**	0.159*	0.132**	0.087*
	[0.044]	[0.034]	[0.033]	[0.091]	[0.053]	[0.046]
CGF Ratio_{t-1}	-40.084***	-25.981***	-11.676***	-22.813*	-19.477***	-14.342**
	[5.782]	[4.455]	[4.342]	[12.693]	[7.141]	[5.904]
Constant	20.765*	16.024*	-0.466	-15.443	2.136	10.39
	[10.911]	[8.194]	[8.710]	[28.492]	[17.621]	[13.376]
Bank-Specific Variables	Yes	Yes	Yes	Yes	Yes	Yes
TR Macro Variables	-	-	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.978	0.977	0.973	0.956	0.964	0.960
Number of Observations	192	288	384	192	288	384

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate of TL saving and commercial deposits. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Table C2: The Effects of LDR on Loan Rates and CGF Loans during CGF Policy Period

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	**Interest Rate of CGF Loans**					
Window:	**6-Months**		**9-Months**		**12-Months**	
LTD_{t-1}	1.888***	0.997***	0.993***	0.553***	1.301***	1.033***
	[0.066]	[0.108]	[0.049]	[0.088]	[0.087]	[0.164]
LTD_{t-1} * CGF Ratio_{t-1}	1.157***	0.737***	0.518***	0.529***	0.579***	0.521***
	[0.059]	[0.123]	[0.048]	[0.116]	[0.043]	[0.115]
CGF Ratio_{t-1}	-147.366***	-65.765***	-63.295***	-30.785**	-58.239***	-33.049**
	[6.470]	[14.547]	[5.182]	[13.544]	[4.752]	[13.435]
Constant	100.411***	-163.222***	-6.73	-76.451***	-140.596***	-141.315***
	[20.775]	[30.295]	[12.272]	[23.131]	[16.812]	[30.723]
Bank-Specific Variables	Yes	Yes	Yes	Yes	Yes	Yes
Bank-Firm Variables	Yes	Yes	Yes	Yes	Yes	Yes
TR Macro Variables	-	-	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	-	Yes	-	Yes	-
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time (Year-Month) F. Effects	Yes	-	Yes	-	Yes	-
(Firm*Year-Month) F. Effects	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
R2	0.615	0.643	0.619	0.656	0.625	0.662
Number of Observations	177,781	50,412	220,660	53,836	240,361	54,712

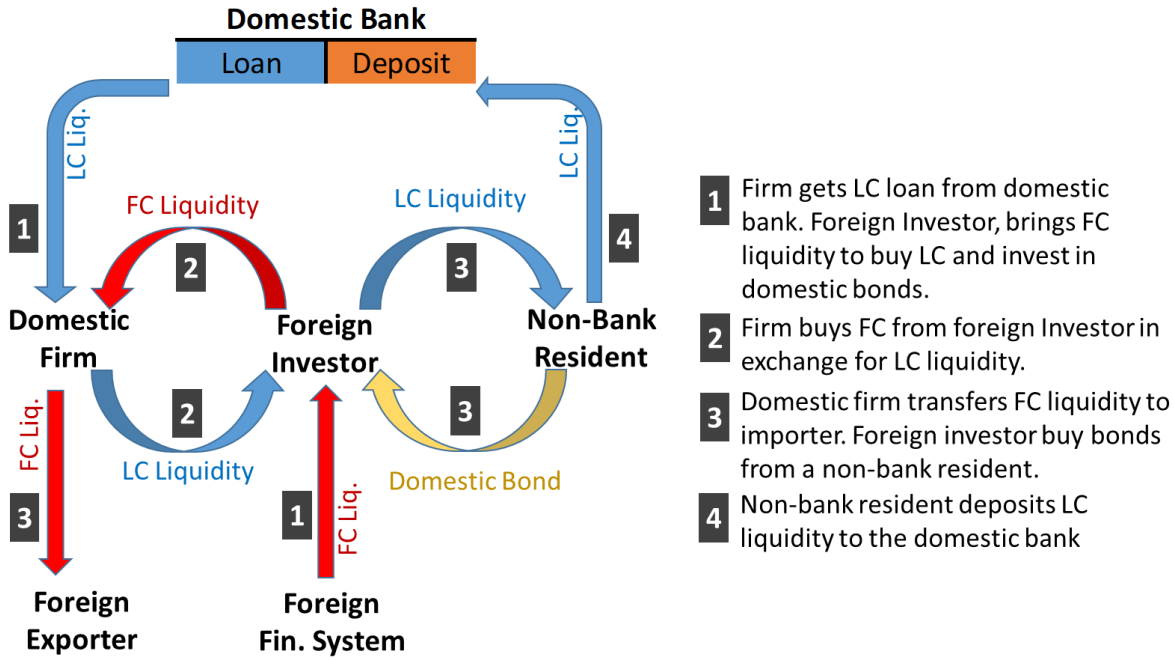
Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate of new commercial loans. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Appendix 1: Financing of Current Account Deficit and LDR

Import bill financed by domestic bank local currency loan

Consider the case where firms pay import bill by borrowing in local currency (LC) from a domestic bank (Figure A2.1). After taking out a LC loan from domestic bank, the domestic firm has to buy FX liquidity in exchange for its LC liquidity. In this case, non-residents should be taking a long position in LC. This could take the form of FDI or portfolio inflows. The effect of these transactions on bank deposits depends on how foreign investors allocate LC liquidity that they obtained from the domestic firm. The case of FDI is straightforward; foreigners spend LC liquidity in the host economy and thus LC liquidity will be passed to residents and end up in domestic banking system. In the case of portfolio flows, the result would depend on which domestic agent sells the assets to foreigners. If foreign investors buy portfolio assets from nonbank residents, then again LC liquidity will end up as deposits in domestic banking system. In both cases, ultimately deposit volume will increase as much

Figure.A1: Import bill financed by domestic bank local currency loan



as the loan volume. Therefore, if the initial LDR figure is below 100%, LDR would increase. However, if foreigner investors buy portfolio assets (e.g., government bonds) from domestic banks, then domestic bank's deposits will not increase, instead banks' security portfolio will decline, which will bring about an increase in LDR, independent of the initial level of LDR. However, since 2003 nominal value of banks' bond holdings has rarely declined and whenever it happened the declines as a share of total holdings were negligible.

Import bill financed by domestic firm's local currency deposits

Another possibility is that domestic firm doesn't need a loan to pay for its imports and has enough LC liquidity held at a domestic bank in the form of deposits. Again, firm has to exchange its LC liquidity with FX. The following steps are same as the case of taking a LC loan from a domestic bank. Again, this requires foreign investors taking long position in LC, that is, selling their FX in exchange for local currency. This could happen through portfolio inflows or FDI inflows. A simple balance sheet analysis shows that these transaction does not drive a wedge between the growth dynamics of loans and

deposits. However, there is one exception; if foreign investors buy domestic securities from domestic banks, then LDR of the sector unambiguously increase. However, since 2003, nominal value of Turkish banking sector's total bond holdings has rarely declined and whenever it happened the amount of declines relative to the total holdings were negligible.

The financing of CA deficit in Türkiye

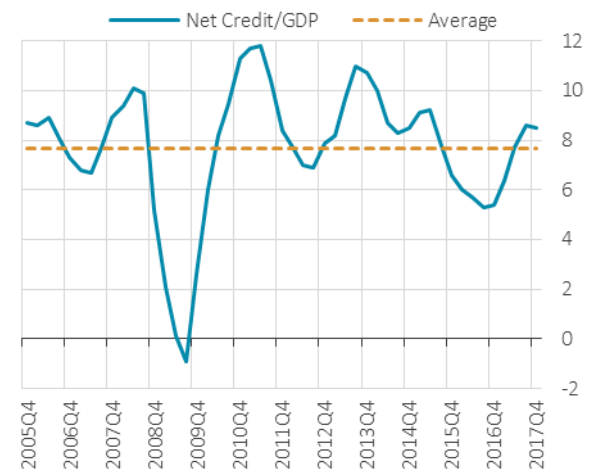
Turning to Turkish data, the largest capital inflows as a share of total consist of banks' and firms' direct borrowing from abroad, including international bond issuances.[38] Excluding FDI inflows, these two items account for about 85% of cumulative capital inflows in 2002-2016 period.[39] Therefore, the main driver of the upward trending LDR has been banks' borrowing from abroad and lending to domestic firms, which, in turn, uses the FX liquidity for their external payments.

[38] Unlike loans obtained from abroad, which are booked under "Other Investments", funds raised by banks and firms through international bond issuances are booked under "Portfolio Investment" of Balance of Payments statistics.

[39] FDI inflows account for 30% of cumulative capital inflows in the same period. Therefore, after including FDI inflows, the above-mentioned two items make up for around 60% of total cumulative inflows.

Appendix 2: Parameters of the Dynamic Model

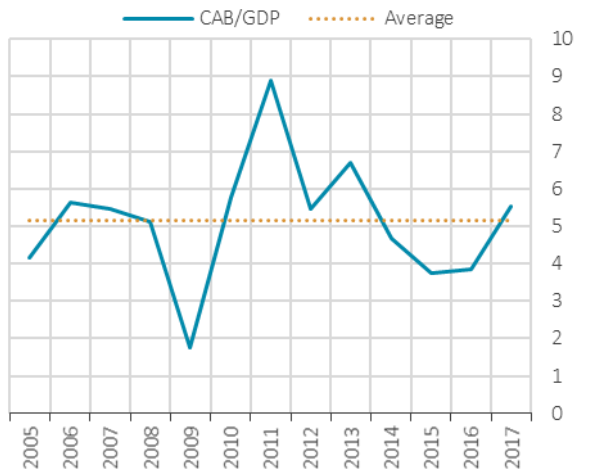
Graph A1: Annual Change in Credit Stock (Net Credit) to GDP (μ, %)



Source: BRSA, TurkStat Latest Data: 12.17

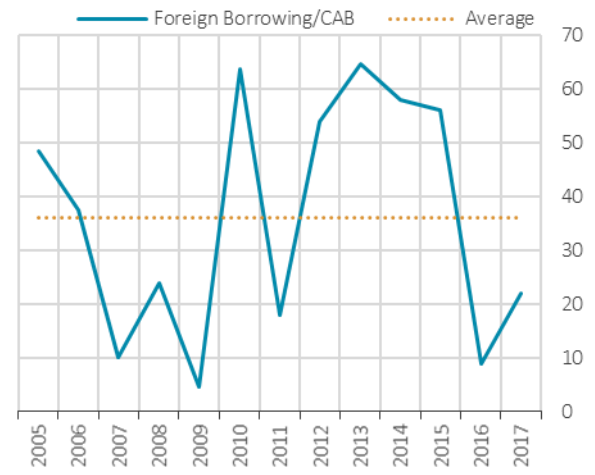
Note: Shows the ratio of FX-adjusted annual credit growth to GDP.

Graph A2: Current Account Balance to GDP (σ, %)



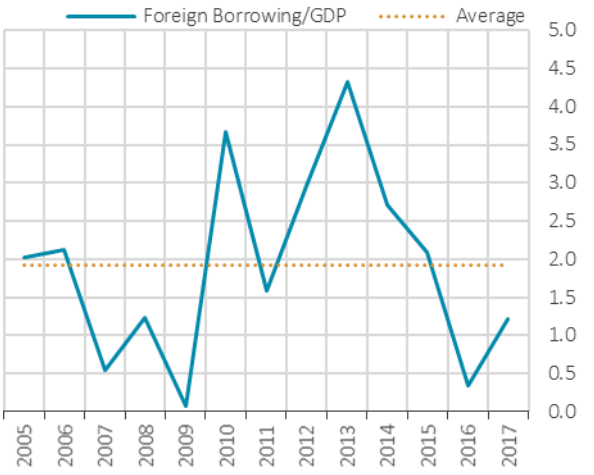
Source: BRSA, TurkStat Latest Data: 2017

Graph A3: Banks' Foreign Borrowing to Current Account Balance (θ, %)



Source: BRSA, TurkStat Latest Data: 2017

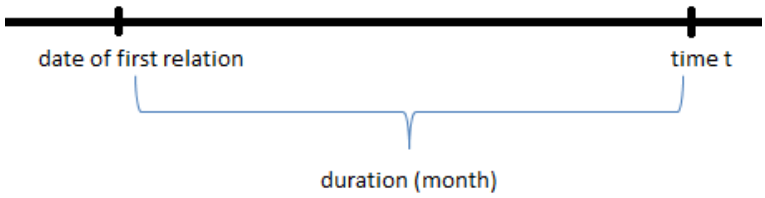
Graph A4: Banks' Foreign Borrowing to GDP (θσ, %)



Source: BRSA, TurkStat Latest Data: 2017

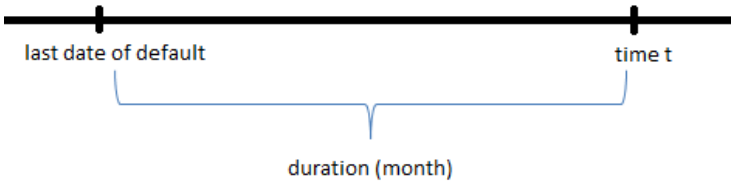
APPENDIX 3 ***Robustness Checks for Alternative Measures of Relationship Banking and Loan Riskiness***

In Robustness Table 1A through 2B, we replicate our results in Table B2 and B3 using different relationship and riskiness measures, respectively. In Table B2, our measure to indicate the depth and strength of bank-firm relationship is the ratio of loans a firm obtained from a particular bank to the total loans (relationship indicator 1). In Robustness Table 1A, we replace our measure with the natural logarithm of the duration between the dates of first loan relation and observation (relationship indicator 2).



In Robustness Table 1B, we replace our measure with the product of first and second relationship indicators to weight the duration with loan amount. Results support our previous findings in Table B2.

In Table B3, our measure depends on the duration between last date of firm default and observation date.



To indicate the riskiness of borrower firm we use the following formula:

$$Riskiness = \left(\frac{1}{duration}\right)$$

where $duration$ equals to the sum of month between the last date of a firm has a nonperforming loan and the observation date. In Robustness Table 2A, we create a dummy variable that indicates whether a specific firm defaults within last 3 years, and use this measure as a riskiness indicator in our model. In Robustness Table 2B, we use the internal rating of lender banks on borrower firms as a robustness check. Similarly, results support our previous findings in Table B3.

Robustness Table 1a: The Effects of LDR on the *Interest Rate* across Different Bank-Firm Relationship Ratios

	(1)	(2)	(3)	(4)
Dependent Variable:	**Interest Rate**			
LTD_{t-1}	-0.010***	0.415***	0.387***	-
	[0.000]	[0.005]	[0.005]	
LTD_{t-1} * RelationshipRatio2_{t-1}	0.009***	0.007***	0.003***	0.006***
	[0.000]	[0.000]	[0.000]	[0.000]
Relationship Ratio_{t-1}	-1.103***	-0.810***	-0.413***	-0.647***
	[0.012]	[0.013]	[0.020]	[0.011]
Constant	21.492***	81.888***	41.133***	20.837***
	[0.049]	[0.864]	[1.183]	[0.014]
Bank-Specific Variables	No	Yes	Yes	-
Bank-Firm Variables	No	Yes	Yes	Yes
TR Macro Variables	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	-
Firm Fixed Effects	Yes	Yes	-	Yes
City Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	-	-
(Firm*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**No**
(Bank*Year-Month) Fixed Effects	**No**	**No**	**No**	**Yes**
R2	0.664	0.669	0.769	0.710
Number of Observations	9,667,953	9,667,953	3,382,689	9,667,953

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Robustness Table 1b: The Effects of LDR on the *Interest Rate* across Different Bank-Firm Relationship Ratios

	(1)	(2)	(3)	(4)
Dependent Variable:	**Interest Rate**			
LTD_{t-1}	-0.001*	0.428***	0.385***	-
	[0.000]	[0.005]	[0.005]	
LTD_{t-1} * RelationshipRatio3_{t-1}	0.037***	0.065***	0.102***	0.043***
	[0.001]	[0.001]	[0.001]	[0.001]
Relationship Ratio_{t-1}	-5.676***	-8.946***	-13.566***	-6.346***
	[0.065]	[0.068]	[0.166]	[0.061]
Constant	21.216***	82.690***	40.132***	21.594***
	[0.048]	[0.853]	[1.171]	[0.013]
Bank-Specific Variables	No	Yes	Yes	-
Bank-Firm Variables	No	Yes	Yes	Yes
TR Macro Variables	-	-	-	-
Bank Fixed Effects	Yes	Yes	Yes	-
Firm Fixed Effects	Yes	Yes	-	Yes
City Fixed Effects	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	-	-
(Firm*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**No**
(Bank*Year-Month) Fixed Effects	**No**	**No**	**No**	**Yes**
R2	0.665	0.671	0.771	0.712
Number of Observations	9,667,953	9,667,953	3,382,689	9,667,953

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Robustness Table 2a: The Effects of LDR on the *Interest Rate and Amount* of Turkish Banks' New Domestic Lending across Firms Having Different Riskiness Level

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	**Interest Rate**			**Amount**		
LTD_{t-1}	0.019***	0.432***	-	-0.003***	-0.006***	-
	[0.000]	[0.005]		[0.000]	[0.001]	
LTD_{t-1} * Riskiness2_{t-1}	0.006***	0.001	0.006***	-0.007***	-0.007***	-0.008***
	[0.002]	[0.002]	[0.002]	[0.000]	[0.000]	[0.000]
Relationship Ratio_{t-1}	3.259***	3.732***	3.194***	-0.392***	-0.390***	-0.363***
	[0.209]	[0.216]	[0.185]	[0.041]	[0.041]	[0.041]
Constant	18.185***	79.096***	21.082***	4.295***	5.594***	3.917***
	[0.034]	[0.849]	[0.013]	[0.009]	[0.193]	[0.001]
Bank-Specific Variables	No	Yes	-	No	Yes	-
Bank-Firm Variables	No	Yes	Yes	No	Yes	Yes
TR Macro Variables	-	-	-	-	-	-
Bank Fixed Effects	Yes	Yes	-	Yes	Yes	-
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	-	Yes	Yes	-
(Bank*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**No**	**No**	**Yes**
R2	0.666	0.672	0.713	0.622	0.623	0.625
Number of Observations	9,667,953	9,667,953	9,667,953	11,041,279	11,041,279	11,041,279

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate or natural logarithm of the amount of new commercial loans. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.

Robustness Table 2b: The Effects of LDR on the *Interest Rate and Amount* of Turkish Banks' New Domestic Lending across Firms Having Different Riskiness Level

Dependent Variable:	**Interest Rate**			**Amount**		
LTD_{t-1}	0.047***	0.355***	-	0.004***	0.000	-
	[0.001]	[0.005]		[0.000]	[0.001]	
LTD_{t-1} * Riskiness3_{t-1}	-0.020***	-0.007***	0.001**	-0.003***	-0.003***	-0.003***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Relationship Ratio_{t-1}	2.350***	0.868***	-0.078***	0.327***	0.358***	0.374***
	[0.028]	[0.029]	[0.026]	[0.007]	[0.008]	[0.008]
Constant	13.375***	89.912***	19.490***	3.793***	6.462***	4.084***
	[0.076]	[1.197]	[0.018]	[0.022]	[0.278]	[0.002]
Bank-Specific Variables	No	Yes	-	No	Yes	-
Bank-Firm Variables	No	Yes	Yes	No	Yes	Yes
TR Macro Variables	-	-	-	-	-	-
Bank Fixed Effects	Yes	Yes	-	Yes	Yes	-
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
City Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Sector Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Currency Type Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Time (Year-Month) Fixed Effects	Yes	Yes	-	Yes	Yes	-
(Bank*Year-Month) Fixed Effects	**No**	**No**	**Yes**	**No**	**No**	**Yes**
R2	0.669	0.677	0.716	0.611	0.612	0.614
Number of Observations	5,161,475	5,161,475	5,161,474	6,031,977	6,031,977	6,031,976

Note. -- The table reports estimates from ordinary least squares regressions. The dependent variable is the interest rate or natural logarithm of the amount of new commercial loans. Table 1 contains the definition of all variables and the summary statistics for each included variable. Coefficients are listed in the first row, robust standard errors are reported in the row below, and the corresponding significance levels are placed adjacently. "Yes" indicates set of characteristics or fixed effects. "No" indicates set of characteristics or fixed effects is not included. "-" indicates that the indicated set of characteristics or fixed effects are comprised in the wider included set of fixed effects. *** Significant at 1%, ** significant at 5%, * significant at 10%.