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Abstract

We examine the role of the international credit channel in Turkey over 2005–2013. We show that larger, more capitalised banks with higher non-core liabilities increase credit supply when capital inflows are higher. This result is stronger for domestic banks relative to foreign banks and survives during the crisis period of post 2008, when foreign banks in general stop lending in emerging markets and retreat to their home countries. By decomposing capital inflows into bank and non-bank flows, we show the importance of domestic banks' external borrowing for domestic credit growth.

JEL Classification: E0, F0, F1

Keywords: Capital Flows, Bank-Lending Channel, Bank Heterogeneity

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1 Introduction

A central question in international macroeconomics is the transmission of real and financial shocks across countries. As shown by many, international banking linkages have a special role in such transmission.[1] The role of common financial shocks is particulary important, where during crisis times, global banks stop lending in many countries at once. A special period is the aftermath of the Global Financial Crisis, when banking flows were mainly directed towards emerging market economies (EMEs), given the ultra low interest rates in advanced countries. As shown by Morais et al. (2015), US and European monetary policies affect the supply of credit from foreign banks to local firms in Mexico.

This paper takes a deeper look at the aggregate credit cycles of an important EME, Turkey, focusing on the role of domestic banks in order to better understand what drives the linkages between the international capital flows and the domestic credit market, i.e., the international credit channel. Unlike Mexico, the typical emerging market country does not have a high concentration of foreign banks, such that their lending is large enough to affect aggregate financing conditions, and thus domestic output. In fact, in Turkey, foreign banks only account for 12 percent of the domestic loan provision. Hence, we would like to know how the rest of the domestic banking sector responds in terms of credit supply when domestic banks can also borrow externally during periods of increased international banking flows. To achieve this goal, we use a unique data set from Turkey between 2005–2013, that covers the universe of loans extended to firms by the universe of banks operating in Turkey, and thus both domestic and foreign banks.

Furthermore, we also explore the importance of several key bank characteristics in order to better understand which types of banks are most affected by capital inflows over the cycle. We focus on three key variables: size, the risk-weighted capital ratio, and the non-core liabilities ratio. The first two variables have been explored in the literature (Kashyap

[1] See among others Kalemli-Özcan et al. (2013a,b); Cetorelli and Goldberg (2011, 2012); Claessens and van Horen (2013); de Haas and van Leylveld (2014); Cerutti et al. (2016); Peek and Rosengren (2000); Schnabl (2012); de Haas and van Horen (2013); Ongena et al. (2015).

and Stein, 2000; Jiménez et al., 2012, 2014) while the focus on the non-core ratio is more novel, and is motivated by recent work by Hahm et al. (2013) who show that this "non-traditional" form of financing is associated with greater risk taking in the banking sector. This type of financing is different than traditional deposit financing and hence more likely to be linked to international capital markets and hence sensitive to global conditions. Finally, we ask how the cyclical behavior of lending varies across bank characteristics for different types of capital flows. This line of inquiry is motivated by the recent findings of Blanchard et al. (2015), who show that non-bond financing has expansionary effects in countries with financial frictions. We show that in the case of Turkey where domestic banks intermediate the capital flows, the most important form of debt flows for domestic credit expansion is banking flows. In the aggregate cross-country data Blanchard et al. (2015) finds "other" flows are expansionary and "portfolio debt" flows are not. We also measure banking flows using the "other" component of capital flows into Turkey. We find no significant effect in terms of domestic credit supply by larger and high non-core liability banks during periods of high portfolio debt flows, whereas banking flows captured by other capital flows component drive our main results.[2]

Our identification methodology relies on the granularity of the credit register data we exploit, which allow us to use borrower(firm)-quarter fixed effects. These fixed effects allow us to control for unobserved and time-varying firm fundamentals that are correlated with credit demand, such as firm quality, riskiness and financial constraints. We can employ such an identification strategy since in our data roughly 50 percent of firms borrow from multiple banks on average over the sample period (representing roughly 75 percent of the total value of loans outstanding), as opposed to a typical credit register data in an emerging market, where this number is around 15-20 percent. Moreover, we control for bank-firm fixed effects, that apart from controlling for time-invariant bank characteristics such as ownership, also control for sticky relationships between firms and banks such as relationship lending.

[2]Banks with a higher risk-weighted capital ratio supply more credit when portfolio debt flows are high, but this result is not robust across different specifications.

Our key results are as follows. First, we show that banks with higher non-core financing extend more credit during periods of high capital inflows. Second, larger banks and banks with higher risk-weighted capital ratios also extend more credit during such periods. The result on bank size is interesting, given that the opposite result is usually found for industrial countries where smaller banks extend more credit when monetary conditions are loose (e.g., Kashyap and Stein (2000)). It has also been found for advanced countries that low capital ratio banks extend more credit during episodes of low interest rates (e.g., Jiménez et al. (2012, 2014)).

One potential explanation for the contrasting results is the following. The literature studying industrial countries is focused on the impact of local monetary policy, which has a larger impact on weaker banks in their local lending, as these banks are more constrained and need the additional liquidity. However, when focusing on the impact of capital flows in an EME, it is the larger, stronger capitalized banks that can take advantage of the global financial conditions in order to intermediate the flows towards the local credit markets.

Our results are not driven by foreign banks, as we show all the results both with the full sample of banks, as well as with a narrower sample of domestic banks. We also find that during the 2008–2013 period, when advanced countries had low interest rates that lead to capital flows into EMs, it was the domestic banks with higher non-core financing that continued to extend credit relatively more than the foreign banks. This result resonates with the finding of Cetorelli and Goldberg (2011, 2012), where credit contraction by foreign banks in the host country depend on the tighter conditions in their home countries.

Our results highlight the importance of capital flows, in particular banking flows, in linking international and domestic cycles via larger and well capitalized banks who can fund themselves in the international capital markets which will be reflected in their higher non-core liability ratio. The importance of banks' non-core financing is a key result. As argued by Hahm et al. (2013), banks are the most important financial intermediaries and they must raise funding in order to lend to their borrowers. When credit is growing faster than the pool

of available retail deposits, the bank will turn to other sources of funding to support its credit growth. In the case of an emerging market like Turkey, this other source is the international capital market. Given the low interest rates in the advanced economies, international capital flowed into EMEs and hence provided the basis of non-core financing for domestic banks. As shown in Figure 1, the ratio of non-core liabilities to total liabilities moved one-for-one with capital flows for the median domestic bank. In this sense, our paper is related to but different from the literature we cite above, which explores how foreign-owned banks vs. foreign funded locally-owned banks transmit shocks. Further, most of the existing papers have examined the transmission of crisis shocks rather than capital inflows and outflows over a cycle, as we do in this paper.[3]

We also contribute to the literature that tries to identify the credit supply channel of monetary policy (Bernanke and Gertler, 1995; Kashyap and Stein, 2000; Jiménez et al., 2012), although we focus on capital flows instead of domestic and/or foreign monetary policy. Some of these papers also analyze loan-level data at the monthly/quarterly frequency with borrower (or borrower×period) fixed effects, exactly as we do. Period fixed effects will capture the direct effect of capital flows and also global shocks and monetary policies as in other work. Differently than this literature, we show that capital flows lead stronger banks to extend more credit.

The paper proceeds as follows. Section 2 briefly discusses the Turkish banking system, and its evolution over time. Section 3 discusses the data. Section 4 presents our identification methodology. Section 5 describes the empirical results, and Section 6 concludes.

2 Banking Environment in Turkey

As of 2016, the Turkish banking industry, which corresponds to approximately 90 percent of the entire financial sector, consists of 52 active institutions. In terms of the key activities, 34

[3]Baskaya et al. (2016) go a step further and focus on what global factors drive the capital inflows, and show that an important part of domestic credit growth can be explained by capital flow push-factors, and in particular by movements in global risk aversion, proxied by VIX, which impact real borrowing costs.

banks in Turkey can be classified as deposit banks. Among the remaining, 13 banks are categorized as investment and development banks and 5 banks are categorized as participation banks. While the investment and development banks are mainly engaged in financing investment, they differ from the deposit banks in the sense that they are not allowed to collect deposits. The participation banks, which constitute around 6 percent of the banking industry in Turkey, differ fundamentally from the other banks in terms of how banking service is conducted. In particular, they offer Islamic banking services, where they are not licensed to accept conventional deposits, but they can accept funds into participation accounts which are not associated with a conventional interest rate.

In terms of ownership structure, one categorization can be made with respect to whether the bank is state-owned and privately owned, whereas an alternative categorization can be made with respect to whether the key majority owner is domestic or foreign. According to the Banking Regulation and Supervision Agency (BRSA) in Turkey, 20 deposit banks (out of 34), 4 investment and development banks (out of 13), and 3 participation banks (out of 5) have majority foreign ownership, defined as having foreign share larger than 50 percent of common equity capital. Among these foreign banks, 6 of them operate as branches and the rest as subsidiaries.

The Turkish credit market and the role of banks have transformed dramatically over the past few decades. In the 1990s, the Turkish banking sector was characterized by a large number of banks, that were mostly involved in financing the fiscal deficits by holding a large share of government securities in their asset portfolios. The high public sector borrowing requirement and resulting high ex-ante real interest rates on the government debt securities further resulted in a substantial crowding-out of investment, consumption expenditures, and demand for credit.[4] Following the 2001 crisis in Turkey, there was a series of banking reforms that transformed the banking industry where banks have high capital adequacy and liquidity ratios, as well as low level of non-performing loan ratios. Banks switched their activity to

[4]See Baskaya and Kalemli-Özcan (2016).

providing credit to the private sector from financing the government debt. The growing availability of credit also allowed households and small and medium enterprises to increase borrowing and expand consumption and investment expenditures.

Turkey experienced a very rapid credit growth in the last decade, where credit growth was reached a high of 40 percent in 2010. With the rapid increase in the credit stock, the loan to GDP ratio also marked a substantial increase, reaching approximately 88% at the end of 2014, which implied that the loan-to-GDP ratio more than doubled since the mid-2000s.

3 Data

All data are sourced from the CBRT. We combine bank-level characteristics with individual loan-level data between banks and firms using unique bank and firm identifiers. We further augment this dataset with capital inflow data for Turkey. The final dataset is at the quarterly frequency. We transform all loan and bank, variables to real values, using 2003 as the base year for inflation adjustment.[5] We discuss briefly discuss the characteristics of each dataset in this section, and refer the interested reader to Baskaya et al. (2016) for more details.

3.1 Bank-Level Data

Turkey has a bank-dominated financial sector, where in 2014, banks held 86% of the country's financial assets and roughly 90% of total financial liabilities. The past decade has witnessed a doubling of bank deposits and assets, while loans have increased five-fold: by 2013 the banking sector's assets represented more than 100 percent of GDP, and loans roughly 70 percent.

Our baseline analysis uses quarterly bank balance sheet data from Turkey for the 2003–13 period.[6] All banks operating within Turkey are required to report their balance sheets as well as extra items to the regulatory and supervisory authorities – such as the CBRT and

[5]We further clean and winsorize the data in order to eliminate the impact of outliers, where we winsorize 1% of the data for the loan and bank variables.

[6]The data are collected at the monthly level, and we simply use March, June, September, and December reports.

the Banking Regulation and Supervision Agency (BRSA) – by the end of the month. We also use extra reporting of the banks, such as their capital adequacy ratios.

Our sample period is over the 2003–13, and the number of banks varies from between 35 and 44 throughout the period due to entry and exit, as well as our focus on loans to only the corporate sector. Table 1 presents summary statistics for our final sample of banks, based on end-of-quarter data pooled over the sample period. These variables, like others used in the paper, are winsorized at the one-percent level. There is quite a bit of variation in bank size, as measured by total assets as noted above. Similarly, there is variation in the capital, liquidity, and return on assets (ROA) across banks and over time. The non-core liabilities ratio, which averages 0.30 in the sample, and has wide variation across banks and over time (the standard deviation is 0.22 in the pooled data). This variable measures the ratio of "non-traditional" (or wholesale) liabilities to total liabilities.[7]

3.2 Credit Register

Our detailed monthly bank-firm individual loan transaction-level data are collected by the BRSA, and provided to us by the CBRT. Banks have to report the outstanding loans at the level of firms and individuals monthly to the BRSA at the transaction level. Baskaya et al. (2016) describe these data in detail and how they are cleaned along various dimensions, including to deal with valuation effects for loans denominated in foreign currency, which arise due to exchange rate movements. We adjust the individual loans for inflation before summing across bank-firm pairs. Further, given our empirical strategy as described in Section 4, we only end up using credit register data for the 2005–13 period, so present summary statistics based on this sample period.

Table 2 reports some key statistics on the coverage of the credit register data based on end-of-year data. Column (1) presents the ratio of corporate loans to total loans for all firms in the dataset,[8] while column (2) presents the same ratio for loans for the final bank-firm-

[7]These liabilities are the sum of (i) payables to money market, (ii) payables to securities, (iii) payables to banks, (iv) funds from Repo, and (v) securities issued (net).

[8]Overall, the growth rate of loans in the corporate sector mirrors that of the whole economy over the

quarter pairs that are included in our regressions. The difference in sample is due to pairs being dropped from the inclusion of firms×quarter fixed effects, which eliminate firms that only have one banking relationship in a given time period. In comparing columns (1) and (2), two crucial facts stand out: (i) the regression sample represents roughly 75% of total corporate loans over the sample period, increasing over time, and (ii) the correlation between the ratios for the whole dataset and the regression sample is 0.99. Therefore, the ultimate sample of loans we use in the regression is representative of the whole corporate sector.

Table 3 next reports summary statistics on banks, firms, and bank-firm pairs in the register for the end of year. The first row, 'Total', presents statistics for the whole period, while the second row, 'Average' presents results based on an average year. As column (1) shows, the number of banks was roughly constant throughout the period, though we note that there was a slight increase in the latter period. There are roughly 3.7 million firms with loans outstanding over the 2005–13 period, with an average of roughly four hundred thousand per period. We should also note that there was a steady increase of firms borrowing over the sample period (see Baskaya et al., 2016, for more details). The total number of bank-firm-quarter pairs in the full sample of data is roughly 5.3 million (column (5)), with 488 thousand pairs per quarter on average. Of these observations, firms with multiple bank relationships (column (4)) make up roughly 50% of total observations throughout the sample period and on average, while the loan share of these firms viz. total loan value is roughly 75% ('Loan Share in Multiple BF', column (6)). Finally, the average number of banking relationships a given firm has over the sample is 1.4 (column (7)). The high degree of firms borrowing from multiple bank is crucial for our identification strategy outlined below in Section 4.

Table 4 presents summary statistics for the credit register data for loans aggregated at the bank-firm pair each quarter. The table reports summary statistics for loans outstanding in thousands of 2003 TL, both for the complete data set as well as for the of bank-firm pairs that we use in the regression specifications, which take into account dropped observations

sample period, where the two series track each other very closely, with a correlation of 0.86.

due to the inclusion of the firm×quarter effects. As can be seen, we lose over half of the sample of bank-firm observations when we condition on the additional fixed effects, but we are still with close to nine million observations. Moreover, these loans tend to be larger on average than the average loan in the whole sample of corporate loans.

4 Empirical Methodology

Our empirical methodology follows the approach used in the credit register literature, by focusing on multiple bank-firm relationships for estimating the impact of capital flows on credit volume and lending rates (see Khwaja and Mian, 2008, who pioneered the approach of exploiting information on firms' borrowing relationships in credit register data to identify the bank lending channel). We extend the two-period first-difference estimation of Khwaja and Mian (2008), as in Jiménez et al. (2012, 2014) into multiple periods fixed effects estimation in order to exploit the panel data at our disposable. Given the fact that error term is not a random walk, a fixed effect estimation (FE) dominates a first difference (FD) estimation.[9]

We begin with data at the the monthly transaction level loan data. However, given that capital inflows data are at the quarterly level and we are interested in examining their interaction with bank-level characteristics, we exploit loan data at the firm(f)-bank(b)-quarter(t) level to use as our unit of analysis. All explanatory variables are either expressed in real terms or as ratios. We regress the loan variable, in logs, on the capital inflows-to-GDP ratio interacted with bank characteristics, which are pre-determined average values. We further augment the regression with time-varying bank-level variables and crucially firm×quarter fixed effects, which capture credit demand. Regressions are all weighted-least square, where weights equal log loans at the $\{f, b\}$ level in a given quarter t. Finally, standard errors are clustered at the institution level.

[9]We run an AR(1) on error terms and find no evidence of persistence.

The regression specification thus takes the form:

$$\log(\text{Loan}_{f,b,t}) = \alpha_{f,b} + \alpha_{f,t} + \beta \left(\frac{\text{Capital inflows}}{\text{GDP}} \right)_{t-1} \times \textbf{Bank}_b + \gamma \textbf{Other Bank}_{b,t-1} + \varepsilon_{f,b,t}, \tag{1}$$

where **Bank** is a beginning-of-period average value (average of 2003-2004), which is either the bank's (i) size (measured as log(assets)), (ii) capital adequacy ratio (CAR), or (iii) or non-core liabilities ratio. In our analysis, we consider the possibility that the endogenous response of bank characteristics to banks' credit supply behavior and capital flows can bias our estimates. Therefore, we take averages over the observations in the 2003q1–2004q4 period as the predetermined values of the bank-level characteristics. Our baseline specification includes all three interaction terms in one specification.[10]

The matrix of "other" time-varying bank-level characteristics, **Other Bank**, includes $t-1$ values of the three interacted variables as controls, as well a banks' return on asset and their liquidity ratio.[11]

5 Empirical Results

Our empirical analysis mainly focuses on three issues. First, we analyze whether there is heterogeneity of procyclicality of bank lending such that the banks with different characteristics, such as size, capital adequacy and non-core liabilities, differ in terms of supplying loans in response to capital inflows.[12] Second, we look at whether domestic banks play a significant role in transmitting the capital inflows into loan outcomes. Finally, we analyze the heterogeneity in bank lending in response to different types of capital flows.

Given that the data vary at the firm-bank-quarter level, Equation (1) allows us to interpret the coefficients on the interactions between capital inflows and the predetermined

[10] Note that we build the interaction term by first demeaning the capital inflows-to-GDP variable in order to quantify the total effects below.

[11] We use ROA rather than non-performing loans as a control, since ROA reflects bad loans and write-offs and hence a more comprehensive variable for bank profits. This also helps with sample coverage, since the NPL variable was missing for longer time periods for several banks.

[12] As shown in Baskaya et al. (2016), exogenous capital inflows driven by low global risk (VIX) have an expansionary effect on domestic credit in Turkey during 2003–2013.

bank characteristics as the differential credit supply effect of capital inflows with respect to banks' characteristics. In particular, our specification includes (i) the bank×firm fixed effects, $\alpha_{f,b}$, which account for any time-invariant unobserved characteristics related to the bank-firm relationship, and (ii) firm×quarter fixed effects, $\alpha_{f,t}$, which account for the time-varying latent firm characteristics affecting the loan outcomes such as the loan demand by the firm. These fixed effects also capture the direct effect of capital flows on loan growth (see Baskaya et al., 2016). Therefore, with the inclusion of these factors, we disentangle the bank credit supply-related variations in the loan outcomes.

5.1 Bank-Level Heterogeneity

Column (1) of Table 5 presents the estimation results for regression (1) using the sample of all banks, i.e., both foreign and domestic, for the 2005–13 period. We first note that the lending of the larger banks are more sensitive to capital inflows than smaller ones. In other words, the loan supplied by the larger banks are more procyclical with respect to the capital inflows. The same result is true also for banks with higher ratios of non-core liabilities and banks with lower leverage. The result on leverage is particularly interesting since in general closed economy literature finds that banks with higher leverage are more proyclical in their credit provision.

Setting the bank characteristics at their mean values over 2003–2004 for size (log(Assets) = 16.35), non-core ratio (0.139), and capital adequacy ratio (0.384), and using the estimated coefficients in column (1), a one standard deviation increase in capital inflows above its sample average, i.e., a 60 percent increase, implies a 4.4 percent increase in loans. This is equivalent to saying that the elasticity of loans with respect to capital flows is 0.07 for banks with average characteristics.[13] To gauge the importance of bank heterogeneity quantitatively, we next apply the same change in capital inflows to values of bank size, non-core ratio, and capital adequacy ratio set at values equal to the 75th percentile (17.34, 0.177, and 0.770, respectively) as well as at the 25th percentile (15.28, 0.093, and 0.161, respectively) values of

[13]Recall that capital flows are demeaned and all bank variables are 2003–04 averaged values.

their distributions. The comparative statics for the interquartile difference in the distribution of bank characteristics imply a 5.9 and 3.4 percent increase in loans, respectively.

The literature has by and large focused on the sensitivity of bank lending to international capital flows arising from the presence of foreign banks (Cetorelli and Goldberg, 2011, 2012). However, the distinct role of the domestic banks in the transmission of foreign liquidity has not been emphasized in the literature to date, despite the potential importance of these banks. In order to provide insights into whether domestic banks are also important in driving the procyclicality of bank lending with respect to capital inflows, we estimate (1) using only the sample of domestic banks operating in Turkey. The results of this regression are presented in column (2) of Table 5. There is a significant heterogeneity in the procyclicality of lending by Turkish domestic banks in response to the capital inflows. In particular, as in the case of the sample for all banks in column (1), the lending by domestic banks with a larger size, more capitalization and a higher non-core liabilities are more responsive to capital inflows.

5.2 Transmission of Capital Inflows to Bank Lending in Turkey Before and After the 2008 Crisis

We next ask whether the sensitivity of bank lending to capital flows changed with the Global Financial Crisis in 2008. To do so, we estimate (1) separately for the 2005Q1–2008Q2 and the 2008Q3–2013Q4 periods. Table 6 presents results of these regressions, where the first three columns consider all banks, while the last three columns focus on domestic banks only.

First, turning to sample of all banks, columns (2) and (3) consider the pre/post sample split, while column (1) repeats the results for the whole sample. In looking at columns (2) and (3), we find that there is a change in the sensitivity of different bank characteristics to capita inflows in the pre- and post-crisis periods. In particular, we find that larger and more capitalized banks increased their lending in response to capital flows relative to smaller and less capitalized banks both before and after the crisis. However, the point estimates are smaller in the post-crisis period. Looking at the interaction with the non-core ratio, we find a more striking result: there is a procyclicality of banks' lending behavior with respect to

capital inflows given the size of their non-core liabilities mainly in the pre-crises period, as suggested by a positive and significant interaction term for 2005Q1–2008Q2 period, but we find no such heterogeneity with respect to non-core liability ratio in the post-2008Q3 period.

This non-finding on the non-core liabilities interaction in the post-crisis period is puzzling given that this period corresponds to industrial countries quantitative easy, and the uptick in capital flows to EMEs. Arguably, it is precisely these capital inflows that EM banks took advantage of to expand their domestic lending, and did so via the expansion of their non-core liabilities. To investigate this possibility, we narrow our focus to domestic banks.

Columns (5) and (6) of Table 6 present the regression results for domestic banks for the pre- and post-crisis periods. As with the whole sample of banks, in columns (2) and (3), we find that domestic banks in Turkey have shown significant heterogeneity both before and after the crises in their lending behavior following capital inflows when considering both size the CAR. Further, like the all bank sample, the coefficients for the interaction terms decrease in absolute value. More interestingly, we find that the non-core liabilities ratio of the banks still played a significant role in the heterogeneous transmission of capital flows to banks' lending both before and after the crisis.

5.3 The role of Different Components of Capital Flows

Figure 1 and Figure 2 show aggregate capital flows into Turkey and their components over the 2003–2013 period, respectively. There is considerable heterogeneity in terms of the variations in the subcomponents of the capital flows. Though FDI is slightly larger than the other two flows for roughly one quarter of the sample period, it is the least volatile component, with a standard deviation around one third of the standard deviation of total capital flows. Portfolio inflows, which are approximately equal to FDI flows, have a standard deviation equal to almost half of that of total capital inflows. Finally, other inflows, which make up slightly less than half of the total capital inflows, is the most volatile component, with a standard deviation around three quarters of the standard deviation of the total inflows.

The three components are different from each other also in terms of their sub-items and relevance to the banking sector. For example, FDI flows are driven by long-term returns. They may also be the most illiquid by nature. The other inflows item, which contains lending by foreign banks to banks in Turkey as an important subcomponent, has a potentially *direct* ability to increase the liquidity of the banks, thereby affecting their lending capacity upon the inflow.

Table 7 presents regressions based on (1) for the domestic bank sample, where now we interact the bank variables with the different capital inflow components. Columns (1)-(3) present results for the whole sample period, the pre-crisis period, and the post-crisis period, respectively. The first overall message we take away from looking across all specifications is that banks show significant heterogeneity in terms of the sensitivity of their lending to other flows. Next, looking at column (1) for the whole sample period, we find that lending by larger banks, more capitalized banks and the banks with larger non-core liabilities are more sensitive to the variations in the other flows. In contrast, the heterogeneity with respect to portfolio flows is observed only across banks with different capital adequacy ratios. Finally, for the entire period, banks with higher non-core liabilities ratio or higher capital adequacy ratio experienced a higher lending at times of greater FDI inflows.

We also observe that the response of the bank lending to the other capital flows item, for which cross-border flows to the banks play an important role, is heterogeneous with respect to bank size, non-core liabilities and capital adequacy ratios both before and after the 2008 crisis. The banks with larger size, better capitalization and a higher non-core liabilities experience a higher procyclicality in their lending in response to an increase in the other capital flows item. Meanwhile, we do not observe a clear pattern of heterogeneity of procyclicality across different sample periods both for the portfolio flows and the FDI flows.

6 Conclusion

The literature that analyzes banks and the international transmission of shocks via banking activity has mostly focused on the sudden transmission of crisis shocks rather than the slow moving impact of capital flows over the cycle. In this paper we examine how capital flows affects the local credit supply in emerging markets, and the bank-level mechanisms behind this international credit channel. For identification, we exploit administrative data from the credit register from Turkey over 2005–13. The use of the credit register is important given that it contains the universe of bank loans to firms in an important emerging market, and allows us to control for time-varying unobserved firm shocks, which proxy for credit demand, via firm×quarter fixed effects.

Our results show that larger, more capitalized banks with higher non-core liabilities increase credit supply when capital inflows are higher. Importantly, these results are stronger for domestic banks, especially in crisis times for banks with more non-core liabilities, which suggest that stronger local internationally-funded banks can transmit global cycles and shocks, not just foreign owned banks. This finding implies that macroprudential regulation of banks should also target the way domestic banks are financed, in particular non-core funding.

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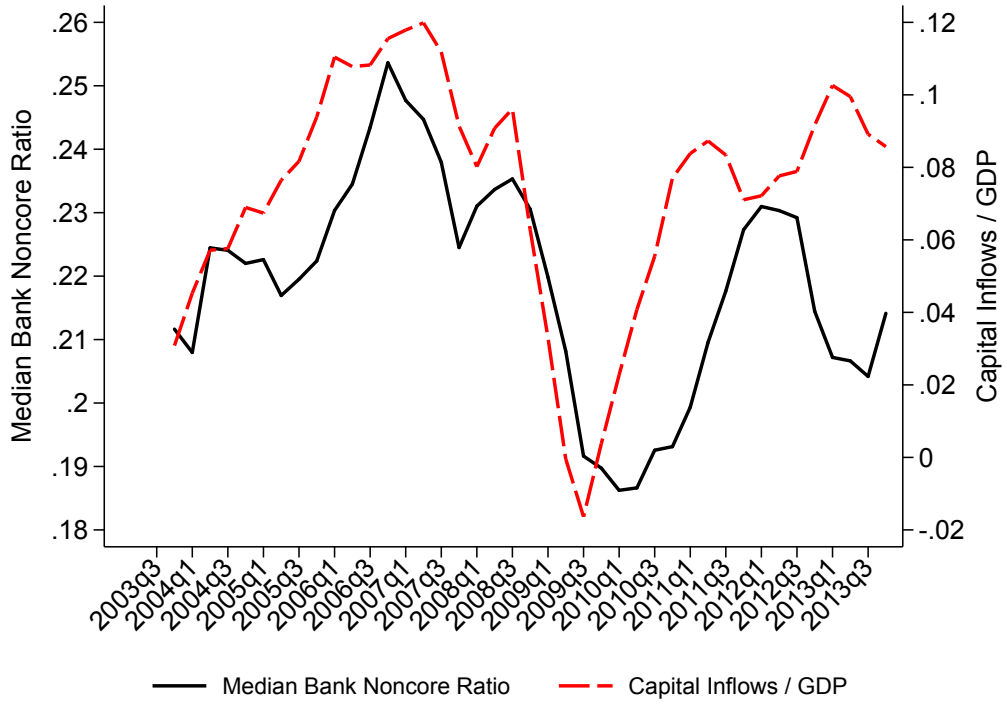
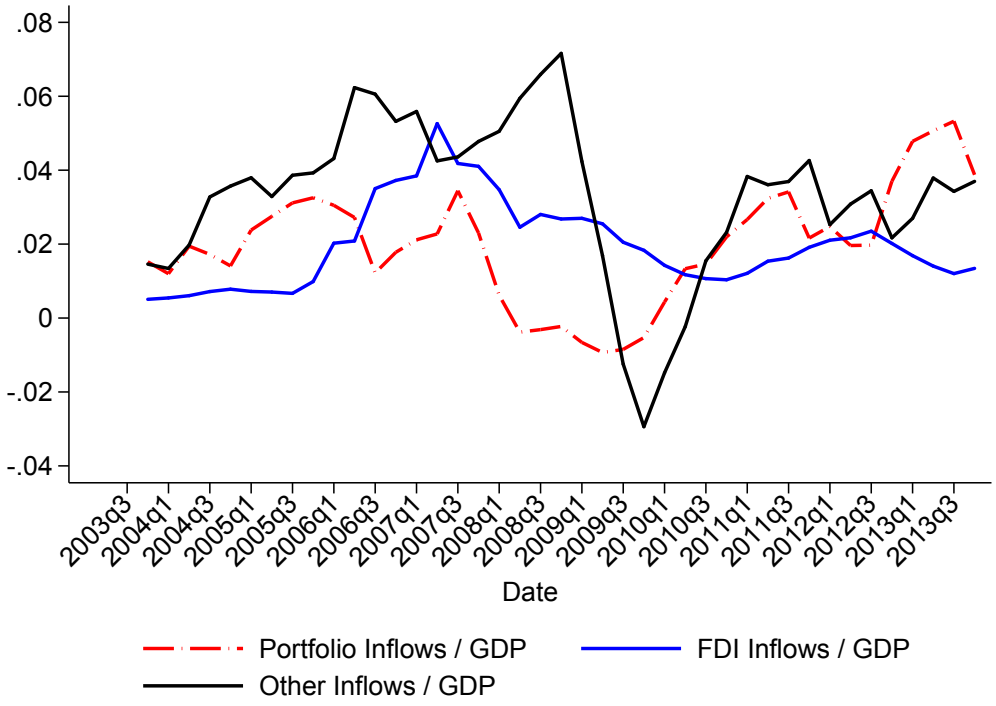
Figure 1. Total Turkish Capital Inflows and Banks Non-Core Financing, 2003–13



Notes: This figure plots Turkey's Total Capital inflows/GDP ratio, and the median's bank non-core liabilities ratio, over time. Both series are four-quarter moving averages. All data are sourced from the CBRT.

Figure 2. Turkish Capital Inflow Components, 2003–13



Notes: This figure plots the breakdown of Turkey's Capital inflows/GDP ratio into (i) Portfolio inflows; (ii) Other inflows, and (iii) FDI inflows over time. All series are four-quarters moving averages. All data are sourced from the CBRT.

Table 1. Bank-Level Quarterly Summary Statistics, Based on Official Bank-Level Balance Sheet Data, 2005–13

	Obs.	Mean	Median	Std. Dev.	Min.	Max.
log(Total Real Assets)	1,392	14.5265	14.55	2.230	8.387	18.31
Capital Adequacy Ratio	1,356	0.210	0.186	0.065	0.128	0.296
Liquity Ratio	1,392	0.390	0.327	0.216	0.018	0.960
Noncore Ratio	1,392	0.300	0.228	0.223	0.000	0.907
ROA	1,392	0.012	0.011	0.010	0.000	0.033

Notes: This table presents summary statistics using quarterly data pooled over the 2005–13 period. 'Total Real Assets' are banks' assets deflated to 2003. The 'Capital Adequacy Ratio' is the Tier 1 risk-weighted capital ratio; the 'Liquidity Ratio' is liquid assets over total assets; the 'Noncore' ratio is non-core liabilities divided by total liabilities; and 'ROA' is return on total assets. Non-core liabilities = Payables to money market + Payables to securities + Payables to banks + Funds from Repo + Securities issued (net).

Table 2. Credit Register Coverage: Corporate Sector, 2005–13

	(1) All	(2) Sample
2005	0.396	0.254
2006	0.455	0.329
2007	0.465	0.338
2008	0.498	0.375
2009	0.500	0.378
2010	0.568	0.433
2011	0.590	0.455
2012	0.623	0.499
2013	0.636	0.492

Notes: This table presents annual summary statistics of the credit register coverage of loans, over the 2005–13 period, using end-of-year data. Column (1) presents rate of corporate to all loans, while column (2) presents statistics based on the sample that includes loans for bank-firm pairs where firm borrow from multiple banks.

Table 3. Credit Register Sample Coverage of Bank-Firm Relationships, 2005–13

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
			Bank-Firm Relationship			Loan Share	Av. No. Rel.
	Banks	Firms	Single	Multiple	Total	Multiple BF	per Firm
Total	44	3,725,368	2,880,800	2,418,916	5,299,716	0.747	1.42
Average	39	413,930	320,089	268,768	588,857	0.757	1.41

Notes: This table presents summary statistics on the frequency of different types of bank-firm relationships within the credit register using end-of-year data. The 'Total' row presents statistics based on the whole sample period, while the 'Average' row presents statistics based on averaging across years. Columns (1) and (2) list the number of banks and firms, respectively (note that the 'Total' number represents the maximum number of banks in a given year over the sample period); column (3) lists the number of observations where a firm has a unique banking relationship; column (4) lists the number of observations where a firm has multiple banking relationships; column (5) lists the total number of bank-firm relationships. Column (6) presents the share of loans (relative to total) from firms with multiple bank relationships, and column (7) presents the average number of multiple banking relationships a firm has in a given year.

Table 4. Credit Register Quarterly Summary Statistics, Bank-Firm Level, All Loans, 2005–13

Panel A. All Loans

	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Loan	19,624,894	135.2	34.84	401.7	1.063	3,789

Panel B. Regression Sample

	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Loan	7,975,254	225.7	58.70	535.5	1.063	3,789

Notes: This table presents summary statistics using quarterly data for aggregate bank-firm transactions over the 2005–13 period. The second panel sample includes loans for all bank-firm pairs with multiple relationships. 'Loan' is the end-of-quarter total outstanding principal for all loans between a bank-firm pair, in thousands of Turkish lira and adjusted for inflation.

Table 5. Capital Inflows and Bank-Level Heterogeneity, 2005–13

	(1) All	(2) Domestic
$(\text{K Inflows/GDP})_{t-1} \times \text{Size}_b$	0.036^a	0.108^a
	(0.010)	(0.012)
$(\text{K Inflows/GDP})_{t-1} \times \text{Noncore}_b$	0.903^a	3.645^a
	(0.182)	(0.233)
$(\text{K Inflows/GDP})_{t-1} \times \text{CAR}_b$	0.672^a	0.928^a
	(0.046)	(0.052)
Observations	7,975,254	5,260,236
R-squared	0.914	0.902
Bank×firm F.E.	Yes	Yes
Firm×quarter F.E.	Yes	Yes
Bank controls	Yes	Yes

Notes: This table presents results for the regressions (1) using quarterly data for all loans. The lagged values of the following bank-level characteristics are also controlled for (not reported completely in all specifications): log(assets), capital adequacy ratio (CAR), liquidity ratio, non-core liabilities ratio, and return on total assets (ROA). The interacted capital inflow and bank-level variables are demeaned before being interacted. Regressions are all weighted-least square, where weights are equal to the natural logarithm of loans. Standard errors are clustered at the firm level, and 'a' indicates significance at the 1% level 'b' at the 5% level, and 'c' at the 10% level.

Table 6. Capital Inflows and Bank-Level Heterogeneity During Regular and Crisis Times

	All Banks			Domestic Banks		
	(1) 05Q1-13Q4	(2) 05Q1-08Q2	(3) 08Q3-13Q4	(1) 05Q1-13Q4	(2) 05Q1-08Q2	(3) 08Q3-13Q4
$(\text{K Inflows/GDP})_{t-1} \times \text{Size}_b$	0.036^a	0.136^a	0.044^a	0.108^a	0.202^a	0.080^a
	(0.010)	(0.029)	(0.010)	(0.012)	(0.034)	(0.013)
$(\text{K Inflows/GDP})_{t-1} \times \text{Noncore}_b$	0.903^a	0.891^b	-0.237	3.645^a	3.112^a	1.605^a
	(0.182)	(0.439)	(0.179)	(0.233)	(0.508)	(0.241)
$(\text{K Inflows/GDP})_{t-1} \times \text{CAR}_b$	0.672^a	1.693^a	0.634^a	0.928^a	1.748^a	0.801^a
	(0.046)	(0.129)	(0.047)	(0.052)	(0.138)	(0.055)
Observations	7,975,254	1,253,718	6,648,229	5,260,236	945,169	4,268,462
R-squared	0.914	0.928	0.921	0.902	0.925	0.908
Bank×firm F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Firm×quarter F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table presents results for the regressions (1), for domestic banks only, using quarterly data for all loans over 2005–13. The lagged values of the following bank-level characteristics are also controlled for (not reported completely in all specifications): log(assets), capital adequacy ratio (CAR), liquidity ratio, non-core liabilities ratio, and return on total assets (ROA). The interacted capital inflow and bank-level variables are demeaned before being interacted. Regressions are all weighted-least square, where weights are equal to the natural logarithm of loans. Standard errors are clustered at the firm level, and 'a' indicates significance at the 1% level 'b' at the 5% level, and 'c' at the 10% level.

Table 7. Capital Inflows and Bank-Level Heterogeneity: Types of Capital Inflows

	(1) 05Q1-13Q4	(2) 05Q1-08Q2	(3) 08Q3-13Q4
$(\text{Other/GDP})_{t-1} \times \text{Size}_b$	0.159^a	0.726^a	0.0837^a
	(0.013)	(0.042)	(0.012)
$(\text{Other/GDP})_{t-1} \times \text{Noncore}_b$	4.624^a	1.907^a	2.993^a
	(0.229)	(0.625)	(0.218)
$(\text{Other/GDP})_{t-1} \times \text{CAR}_b$	1.022^a	0.638^a	1.158^a
	(0.053)	(0.178)	(0.051)
$(\text{Portfolio/GDP})_{t-1} \times \text{Size}_b$	-0.003	-0.006	0.0677^a
	(0.021)	(0.037)	(0.024)
$(\text{Portfolio/GDP})_{t-1} \times \text{Noncore}_b$	-0.494	5.572^a	-1.293^b
	(0.420)	(0.560)	(0.524)
$(\text{Portfolio/GDP})_{t-1} \times \text{CAR}_b$	0.400^a	1.317^a	-0.143
	(0.093)	(0.147)	(0.110)
$(\text{FDI/GDP})_{t-1} \times \text{Size}_b$	0.019	0.222^a	0.349^a
	(0.051)	(0.051)	(0.097)
$(\text{FDI/GDP})_{t-1} \times \text{Noncore}_b$	13.33^a	-0.093	31.70^a
	(0.838)	(0.827)	(1.983)
$(\text{FDI/GDP})_{t-1} \times \text{CAR}_b$	3.117^a	3.270^a	1.312^a
	(0.222)	(0.231)	(0.416)
Observations	5,260,236	945,169	4,268,462
R-squared	0.902	0.925	0.908
Bank×firm F.E.	Yes	Yes	Yes
Firm×quarter F.E.	Yes	Yes	Yes
Bank controls	Yes	Yes	Yes

Notes: This table presents results for the regressions (1), for different types of capital inflows ('Portfolio', 'FDI', and 'Other'), using quarterly data for all loans over 2005–13. The lagged values of the following bank-level characteristics are also controlled for (not reported completely in all specifications): log(assets), capital adequacy ratio (CAR), liquidity ratio, non-core liabilities ratio, and return on total assets (ROA). The interacted capital inflow and bank-level variables are demeaned before being interacted. Regressions are all weighted-least square, where weights are equal to the natural logarithm of loans. Standard errors are clustered at the firm level, and 'a' indicates significance at the 1% level 'b' at the 5% level, and 'c' at the 10% level.