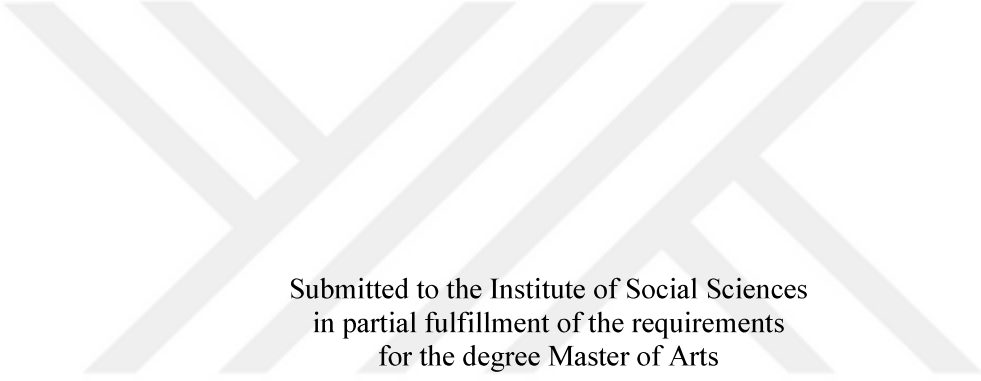


DETERMINANTS OF BANK LENDING DURING CRISES: AN EMPIRICAL ANALYSIS
OF BANKING IN TURKEY

by

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ABSTRACT

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Economics, MA Thesis, 2016

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Keywords: banking, bank characteristics, lending, crises

The Turkish economy experienced two financial crises during the past two decades; one in 1994 and the other in 2000-2001. Bank lending may change in crisis episodes depending on different bank characteristics. This paper analyzes how distinct bank qualities — i.e. ownership status, liquidity, asset quality, profitability, capitalization, and size — affect bank lending during crises. Using data on loans extended by the banking sector in Turkey over the period 1994-2015, we show that bank lending decreases in crisis episodes. We further show that foreign banks play a stabilizing role during crises in Turkey by lending more than domestic banks, whereas state banks cut back their lending more. Our findings also show that bigger banks reduce their lending more in crisis episodes.

ÖZET

KRİZ DÖNEMLERİNDE BANKALARIN KREDİ DAVRANIŞINI BELİRLEYEN FAKTÖRLER: TÜRK BANKACILIK SİSTEMİNİN AMPİRİK ANALİZİ

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Anahtar Kelimeler: bankacılık, banka karakteristikleri, kredi davranışı, kriz

Türk ekonomisi geçtiğimiz yirmi yıl boyunca iki önemli ekonomik kriz atlattı; biri 1994 krizi, diğeri 2000-2001 krizi. Bankaların kriz dönemlerindeki kredi davranışları farklı banka karakteristiklerine göre değişiklik gösterebilmektedir. Bu tez, değişik banka niteliklerinin – ki bunlar banka menşei, devlet/özel ayrımı, likidite, varlık kalitesi, kârlılık, sermayelendirme ve büyüklüktür – bankaların kriz dönemlerindeki borç davranışlarını nasıl etkilediğini incelemektedir. Türkiye bankacılık sektörüne ait 1994-2015 yıllarını kapsayan kredi verilerinin kullanıldığı analizin sonuçları, bankaların kriz dönemlerinde kredilerini azalttığını göstermektedir. Ayrıca, yabancı bankaların, yerli bankalardan daha fazla borç vererek, krizleri hafiflettiği bulgusu elde edilmiştir. Devlet bankaları ise kredilerini bu dönemlerde daha çok azaltmaktadırlar. Ayrıca sonuçlarımız büyük bankaların krizlerde daha çok kredi azalttığını göstermektedir.

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1. Introduction

Turkish economy experienced two major economic crises during the past two decades, the 1994 crisis and the 2000-2001 crisis. Banks may change their lending behavior during crises since resources for lending are scarcer and risk becomes higher during crises. Furthermore, the effect of crises on bank lending may depend on different bank characteristics. This paper analyzes how distinct bank characteristics — i.e. ownership status, liquidity, asset quality, profitability, capitalization, and size — affect bank lending during crises. The analysis is conducted using data from the Turkish banking sector, both for the 1994-2015 period as a whole and focusing exclusively on crisis episodes.

The main interest of this paper is to understand whether banks' lending behavior changes during crisis episodes in Turkey. It is expected that banks reduce their loans during crises because of lack of financial resources and because of increased risk. Another important question is about the lending behavior of foreign banks compared to domestic banks during crises. One view defends that foreign banks continue to increase their lending during host country crises through usage of their internal lending channel with their parent banks. The opposing view argues that foreign banks decrease their lending by selecting more advantageous host countries when an economy is experiencing a crisis. A similar question is formulated about the lending behavior of state banks in comparison to private banks. There are also two dominant views: The first claims that state banks decrease their loans less than private banks as they are large and highly liquid banks which can utilize their own managerial superiority during crisis periods. The rival view states that they reduce their loans more because they act rather more carefully and aim

to minimize risk by cutting back their loans during crises. We are also interested in each bank-specific characteristic's effect on bank lending during crises. We investigate how liquidity, asset quality, profitability, capitalization and size affect bank lending individually during crises.

To find answers to these questions, we conduct an empirical analysis using quarterly data from 53 banks operating in Turkey through the 1994-2015 period. Our main dependent variable is the change in loans, which is the change in the outstanding loan balance of each bank between two quarters. We use liquidity, asset quality, profitability, capitalization and size as bank-specific explanatory variables. The data on bank characteristics used in this paper are obtained from The Banks Association of Turkey. We use real GDP growth, real exchange rate (RER) appreciation and inflation rate as macroeconomic explanatory variables. The data on macroeconomic variables utilized in this paper are retrieved from the IMF's International Financial Statistics database. The effect of crises on bank lending is captured by a crisis dummy that represents the 1994 and 2000-2001 crises. We construct the crisis dummy variable as taking the value 1 if the quarter is a crisis quarter, and zero otherwise. The effect of foreign-ownership is measured by the foreign dummy which takes the value 1 if the bank is a foreign branch or subsidiary, otherwise zero. Similarly the effect of state-ownership is captured by the state dummy which takes the value 1 if the bank is state-owned, otherwise zero. These two ownership characteristics' effect on bank lending during crises is captured by interacting these ownership dummies with crisis dummy in respective regressions. In addition, each bank-characteristics' particular effect during crises is measured by interacting each bank-specific variable with the crisis dummy.

We find that banks reduce their loans during crisis periods. Funds become scarcer during crisis times, and the productivity of economy drops in general. In addition, the risk of lending increases. Considering these negative effects, the decrease in bank lending during crisis episodes

is an expected outcome. Foreign banks do not decrease their lending during crisis times as much as their domestic counterparts. This finding suggests that foreign banks actually take advantage of their internal credit channel with their parent bank in order to finance their lending. As a result they can continue to maintain their lending during crises in the host country. Moreover, we can say that foreign banks alleviate the crisis by supplying funds to the economy when the resources are scarce. State banks lend a lot less during crisis episodes than private banks. This strengthens the view that state banks act rather carefully during crisis episodes because they are the backbone of the economy and they need to keep their stability by minimizing risk in negative periods. Among other bank characteristics that we analyze, only size has a significant effect on bank lending during crises: larger banks exhibit a larger credit drop during contraction times. This behavior is similar to state banks because bigger banks are healthy banks with a well-developed infrastructure. They use their managerial expertise in order to minimize risk during crisis periods, and their response is decreasing loans when the risk is high.

We apply a robustness analysis in order to check the generality of our findings. Firstly, in order to check whether our results hold when we include the 2008 global crisis in our analysis, we construct a new crisis dummy that accounts for the 2008 crisis together with the crises of 1994 and 2000-2001. All explanatory variables maintain their significance and sign; and two interaction terms become significant, i.e. liquidity and profitability. This suggests that our finding hold when we include a global crisis with a different origin. Moreover, we execute two other robustness analyses where we limit our dependent variable to only foreign currency loans and only Turkish Lira loans. All of our explanatory variables preserve their significance and sign in both robustness analyses. Again, profitability and liquidity interactions become significant in

Turkish Lira denominated lending analysis. This indicates that our findings still hold even if only foreign currency or Turkish Lira denominated lending is the focus of interest.



2. Literature Review

How banks' characteristics affect their performance during crisis periods has been a debatable issue in the literature on banking. This paper is connected to the literatures on (i) foreign banks, (ii) state banks and (iii) bank-specific characteristics' effect on lending behavior, and particularly during crisis episodes.

A vast literature exists about foreign banks' performance during crises, from opposing view. One view states that foreign banks deepen the crisis because they increase their lending in developing countries when host country's economy shows good signals; whereas they reduce their loans when the economy is in contraction. For this reason proponents of this view argue that foreign banks' lending behavior is procyclical and they magnify the fluctuations of a crisis. Houston et al (1997) finds two different channels which affect a subsidiary bank's lending behavior. First, a subsidiary bank's lending behavior is affected more seriously from the parent bank's cash flow and capitalization than its own cash flow and capitalization, in the US case. This channel renders subsidiaries affected less from host country shocks, and during crises they tend to decrease their loans less. There is also an opposite channel; parent banks choose more advantageous locations to increase lending. Instead of expanding their lending in a more risky environment, they prefer a growing economy which guarantees returns. For this reason a specific subsidiary's lending behavior is negatively correlated to other subsidiaries' loan expansion. In other words, if rival countries have positive economic milieu, parent banks choose to increase lending in these countries, which result in a reduction in the loans of subsidiaries operating in a crisis-struck country. This substitution effect renders foreign banks as aggravating agents during

crises. Dahl et al (2002) find that foreign banks' loan expansion is backed by net equity financing channels from parent holding companies, for this reason they are less affected by capital scarcity compared to domestic banks. Houston and James (1998) show that holding company affiliated banks affected less from their own cash flows and capitalizations compared to banks without a holding company. This is a stabilizing factor as the credit supply of a subsidiary is affected less by the host country's atmosphere. Ashcraft (2004) finds that banks which are a part of a bank holding have less probability to exhibit financial scarcity and they go out of crisis in a shorter time due to capital movement from the home establishment to the subsidiary.

There are many empirical studies which show that foreign banks serve as a stabilizing factor during crisis episodes. Dages et al. (2000) finds that foreign banks which operated a long period in Argentina and Mexico served as a stabilizing factor during crisis episodes in late 1990s. These banks showed less volatility and fewer drops in lending. Crystal et al. (2002) shows the same movement in Chile, Argentina and Colombia. In addition, the diversification of ownership status decreases the volatility of loans and foreign banks show an observable expansion of loans during these crisis episodes. Adler and Cerutti (2015) looked at the same problem from deposits side and find that only one out of five crises in Argentina and Uruguay foreign banks played the role of a "safe haven", and in other cases didn't increase deposits significantly differently from domestic banks. The works of Peek and Rosengren (2000), Goldberg (2001), De Haas and Van Lelyveld (2004), Martinez Peria et al. (2002) and Kraft (2002) testify that foreign banks increase their lending behavior during crisis episodes as they take advantage of the situation in order to enlarge lending activity. Goldberg (2002) finds that credit growth of US foreign banks operating in other countries is highly correlated with US GDP, but this relation is positive in Latin America

and negative in Asia and industrial countries. Dages et al. (2000) defends that another reason is responsible for the stability, and he shows that foreign banks and domestic banks with high asset quality, i.e. low ratio of nonperforming loans exhibit similar credit behavior, for this reason he claims that asset quality is the real reason of stability, not ownership status.

Other empirical studies show that foreign banks have the opposite effect and they deepen the crisis. Peek and Rosengren (2000) find that foreign banks reduce their loans when the economy slows down in South American countries. Morgan and Strahan (2004) show that there is positive correlation between foreign banks' entry and economic instability because foreign banks prefer to move their lending strategy to the countries with higher return and as during a crisis episode productivity decreases, these banks channel their resources to more advantageous countries, deepening the crisis. Clarke et al. (2005) find that foreign banks lend less to small business than domestic banks in Chile and Peru, but similarly in Argentina and Colombia. This firstly raised questions about foreign banks' negative effect, however careful study showed that what matters is the size and impact of foreign bank in a country. In above study, large foreign banks that have a presence in a country give more credit to small businesses. Detragiache et al. (2008) find that foreign banks benefits only large transparent firms, and the small firms either worse off or same. Moreover, Jeanneau and Micu (2002) show that foreign banks' credit growth in developing countries depends on the performance of developed economies, for this reason they have the risk of transmitting large economies' crises into developing ones. Peek and Rosengren (1997) exemplifies this phenomenon by studying Japanese Stock exchange drop in 1990, and Japanese banks' reduction of loans in United States. According to Martinez Peria et al. (2002) only Japanese banks decreased their lending behavior whereas all other foreign banks increased their loans in the same locale, which suggest that home country shocks are transmitted

via foreign banks. Detragiache and Gupta (2006) shows in their analysis of foreign banks in Malaysian crises of 1998-1999 and 1998 that being a foreign bank does not guarantee to be immune to a crisis: Non-Asian oriented banks performed better than Asian oriented foreign banks however these difference is rather explained by bank-level variables such as paucity of nonperforming assets. In their study of foreign banks' performance in developing countries Van Rijckeghem and Weder (2000, 2001) and Peek and Rosengren (2000) use aggregate data from Bank for International Settlements (BIS). This paper follows De Haas and Van Lelyveld's (2006, 2010) approach by employing bank-level data in order to capture bank specific factors affecting credit growth performance. This paper contributes to foreign bank lending literature by examining lending behavior of foreign banks which operate in Turkey, particularly during the crises of 1991 and 2000-2001.

The literature on state bank's lending performance during crises is divided into two camps: Defenders of the first argument claims that state banks have less profitability, less efficiency and they decrease their lending more during crises. The opposite view defends that state banks increase their lending during crisis episodes. Among the first view, Barth et al. (2001) shows that state banks have lower efficiency and lower level of financial development in a cross-country analysis. In addition, Beck et al. (2007) find that state banks have lower outreach. Moreover, La Porta et al. (2002) reach the conclusion that high concentration of state banks trigger wider intermediation spreads, lower GDP growth and bigger financial fluctuations. Furthermore, Mian (2005) shows that state banks exhibit more loan loss provisioning and their profitability is lower than private banks in his study on many emerging economies. Micco et al. (2007) find that state banks in emerging economies operate more costly and eventually they have less profit than private banks. Cornett et al. (2010) study state banks which are in operation in

sixteen Asian countries and they find that state banks show more credit risk and have less profit than private banks until 2001, but this difference becomes smaller after the Asian crisis. Berger et al. (2005) shows that state banks' performance is low in 90s, and their productivity increases significantly through privatization in their study of Argentina banking system. Lin and Zhang (2009) show that the largest four state banks exhibit less profitability, less productivity and a higher ratio of non-performing loans to total loans than domestic and foreign private banks in their analysis of Chinese banking system.

Among the opposite view, there are some studies which find that state banks increase their lending during crisis periods. Micco and Panizza (2006) show that state banks' lending behavior is less procyclical than private banks in their panel-data study with a variety of international banks during 1995-2002 periods. This implies that state banks does not deepen the crises, in contrast they alleviate it. Moreover, Iannotta et al. (2011) cannot find evidence for the difference between state banks' and private banks' lending behavior in their panel-data analysis of 210 Western European Banks through years 2000-2009. In addition, Cull and Martinez Peria (2012) find that state banks in Latin America increase their lending during crises in their study of Latin American and Eastern European banking systems. Nevertheless state banks in Eastern Europe decrease their lending during crises, suggesting that regional effects should be taken into account. This paper contributes to state bank's bank lending literature by illustrating Turkish state banks' performance during crises occurred between 1992 and 2015.

The literature on bank characteristics' effect on lending performance during expansion periods and/or crises has diversified results. Hoffman (2001) and Calza et al. (2001) show that real interest rates have a negative effect on bank lending in their study on the determinants of credit to the private non-bank sector in 16 industrialized countries between 1980-2001 periods

and on Euro area banks over 1983-2003 period. Moreover, Reinhart and Rogoff (2010) find that non-performing loans is a bank-specific variable which indicates the onset of a banking crisis. Berger and de Young (1997) find that capitalization has negative effect on nonperforming loans in their panel-data study encompassing US banks throughout 1985-1994. Furthermore, Clarke et al. (2005) find that profitability and capitalization have positive effect on bank's lending to small business whereas bank size and asset quality affect loans to small business negatively.

Papers investigating bank-specific variables - particularly capitalization, size, liquidity profitability and asset quality - found different results about these variables' effect on bank lending. De Haas and van Lelyveld (2010) find that profitability has positive effect on bank lending while asset quality, liquidity and capitalization are negatively correlated to credit growth. In addition, Dahl et al (2002) finds that liquidity and size have positive effect on bank's lending behavior whereas capitalization has a negative effect. Houston et al. (1997) show that capitalization has a positive effect on loan growth whereas size has a negative effect on bank lending. De Haas and van Lelyveld (2006) show that capitalization and profitability have a positive effect on bank's credit growth while liquidity and size affect the change in bank's loans negatively. This paper contributes to this literature by controlling these variables in the context of Turkey during normal periods as well as 2 crisis episodes. In addition, we both check bank-specific variables overall effect on bank lending and also their specific performance during crises.

3. Background: Crises in Turkey

Turkish economy is struck with two major crises during last two decades: the first one is in April 1994 and the second one is in November 2000-February 2001. The beginning of 1994 is marked with macroeconomic instabilities such as high current account and budget deficits. In addition, the end of 1993 and beginning of 1994 period is articulated with entries of high amount of speculative capital. This negative atmosphere is even perturbed by the Turkish Government's pressure on reducing interest rates in order to ease public interest burden. To realize these goals, liquidity is supplied to the economy, but this liquidity increase did not reduce demand of foreign currency, on the contrary it skyrocketed. Moreover, the high current account deficit increased the expectations about a possible devaluation of Turkish currency, which further increased the demand for foreign currency. In March 1994, the interbank overnight interest rate reached 1000%. As a prevention tactic, foreign currency reserves are sold; nevertheless it did not bear the intended outcome because banks hold the devaluation expectation and the demand for foreign currency continued. As a result the Turkish Lira – US Dollar exchange rate doubled from January 1994 to April 1994, and Central Banks's dollar reserves halved throughout this period. In order to consolidate the economy, the Turkish government declared the April 5th decisions which aimed to finally stop the flight to foreign currency and to prevent further public debt with very harsh measures. As a prevention strategy, the Turkish government borrowed with a 400% interest rate. As a result, on 20th of April Marmarabank declared bankruptcy and on 17th of May Turkey entered under IMF surveillance after 14 years. As a consequence, that year the Turkish GDP shrank by 6.1%.

Preceding the crisis of 2000-2001, Turkey is struck by two earthquakes in 1999, which happened in the industrial heartland of Turkey. As a result, output declined by 3.4% in 1999. The inflation rate rose to 70% and Treasury bill rates reached 106% annually on average at the end of 1999. As a result, Turkey made a 3 year stand-by agreement with IMF. The program aimed at a reduction of inflation; however improvements are not observed quickly and the RER started to appreciate. Imports increased quickly, which triggered worries about current account deficit. These events increased liquidity demand of banks whose assets mainly comprised of treasury bills. This ended up in a scarcity of liquid assets, which eventually led to a liquidity crisis on November 2000. Banks started to close their interbank credit channels to vulnerable Turkish banks. Foreign investors started to sell their treasury bills and leave the country. On November 20th, Demirbank was not able to borrow in the interbank market and it sold some of its government securities portfolio. This led to a massive capital outflow, and a systemic banking crisis. On 30th of November, the Central Bank stopped giving emergency line of loans. As a result, interbank rate skyrockets to 873%, causing an acute liquidity crisis. On 6th of December, Demirbank declared bankruptcy. Consequently, overnight interest rate rose from 39% in October to 95% in November and to 183% in December. 2000 crisis is experienced as a twin crisis as currency crisis occurred in February 2001 after the financial crisis of November 2000. After a publicized debate between Prime Minister and President of Republic, trust in sustainability decreased and a currency crisis occurred. The stock market fell by 14% next day and overnight interbank rates reached 7500%. As a result, the government allowed Turkish Lira to freely float on 22 February. The consequences of 2000-2001 crisis are shrinking of the Turkish GDP by 5.3% that year, and public debt rose to 74% of GDP from 38%.

4. Data and Descriptive Statistics

4.0.1 Data

The data on bank characteristics used in this paper are obtained from The Banks Association of Turkey (Türkiye Bankalar Birliği, from now on TBB). TBB's database covers all of the banking system in Turkey and contains quarterly balance sheet and income statement data for all banks operating in Turkey. TBB's quarterly data about individual banks' balance sheets and income statements goes back to 1994's first quarter, and no quarterly data is available before that period. For this reason, the beginning of our sample period is the first quarter of 1994; and the data continue until the third quarter of 2015, encompassing a period of 87 quarters. Thus, we obtained banking data for all domestic and foreign banks included in TBB's dataset for the period 1994-2015. The bank-specific explanatory variables that we construct using the TBB data are liquidity, asset quality, profitability, capitalization and size. The way we construct these variables is explained in section 5.0.1.

The macroeconomic variables that we use as explanatory variables in the regressions are the growth rate of real GDP, RER appreciation and inflation rate. The data for all macroeconomic variables are obtained from IMF's International Financial Statistics database. The definitions of these variables are also given in section 5.0.1.

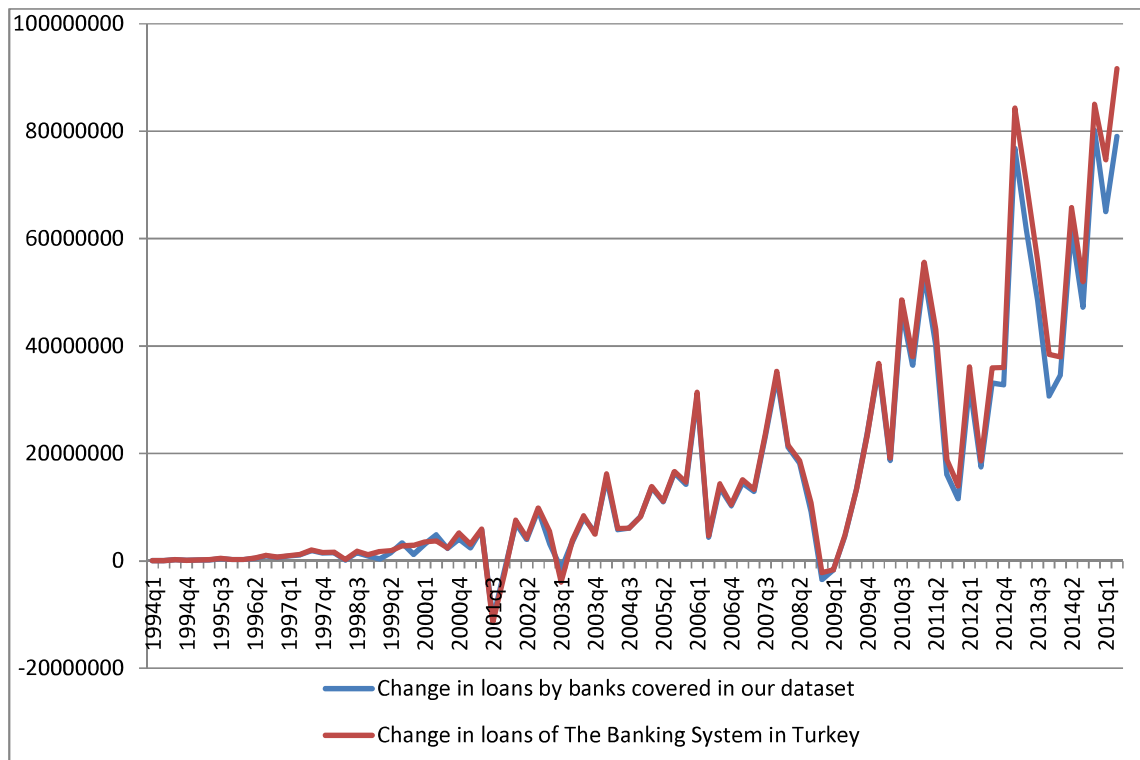
We removed investment banks from our sample because their behavior does not correspond to the credit behavior of deposit banks. We also remove banks which contain less than 10 observations in any variables because they seriously distort the analysis.

4.0.2 Descriptive Statistics

We use 53 banks operating in Turkey during the 1994-2015 period in order to analyze the effect of bank characteristics' on lending behavior during crises. In order to achieve this empirical endeavor, we firstly need to certify that our dataset is representative of the Turkish banking system as a whole throughout these dates. To check the coverage power of our dataset, we plot the graph of change in loans by the banks employed in our dataset and by all banks in the banking system in Turkey between 1994 and 2015 on Graph 4.1. As the graph shows, the two lines overlap almost perfectly, which guarantees that our dataset has a good coverage of the loans extended by the banking system in Turkey.

We then compare the summary statistics of our dataset during the whole time period (1994-2015) and during the crisis periods (crises of 1994 and 2000-2001), which are reproduced in Table 4.1 and Table 4.2. We investigate each bank-specific characteristic's mean values during overall and crisis periods. Liquidity's mean value decreased from 6% to roughly 1.5% in crises. It is logical that during crisis episodes assets which can be quickly turned into cash drops. This scarcity of liquidity is one of the determining characteristics of crises and our summary statistics confirms it. The standard deviation also drops by 4%, which stems from the same argument discussed in the previous paragraph. The most dramatic drop is observed in the maximum possible liquidity level, as it drops from 72% to 12%, which is in line with the interpretation.

Graph 4.1 Dataset's coverage of the banking system in Turkey:



Asset quality increases six times, which means the ratio of nonperforming loans to total loans is multiplied by six during crisis episodes, which is an expected result. Profitability has counter intuitive results, as it increases from 2.6% to 2.9%, which implies banks make slightly more profits during crises. It might be explained by the paucity of profits overall the timeline: the value is so small that it engulfs the individual peaks in profits. However, another explanation may be the existence of relatively high interest rates during crisis periods which increase the resulting returns.

Table 4.2 Summary statistics for the whole sample

Variables	Obs	Mean	Std. Dev.	Minimum	Maximum
Change in Loans (in 1000 TL)	3297	413.6714	1358.286	-4033.904	16438.12
Liquidity	3065	0.0621543	0.0834543	0	0.7231853
Asset Quality	2851	0.0563279	0.0996219	0	0.9970675
Profitability	3106	0.0260038	0.0564716	-0.6323945	0.6519981
Capitalization	3332	0.1303556	0.2336308	-5.569767	0.999516
Size	3350	13.19742	3.240945	0	19.51624
Real GDP Growth Rate	4558	3.959764	5.673067	-14.73771	13.75189
RER Appreciation	4558	0.4374534	7.146569	-24.1901	23.83359
Inflation rate	4558	7.391222	7.422733	-0.03698699	40.53571

Table 4.3 Summary statistics for the crisis periods

Variables	Obs	Mean	Std. Dev.	Minimum	Maximum
Change in Loans (in 1000 TL)	252	48.92	176.6568	-841.975	918.406
Liquidity	250	0.0152161	0.0206909	0.0000194	0.125188
Asset Quality	220	0.3008384	0.1150117	0	0.8360572
Profitability	193	0.0299096	0.0411375	0	0.2419978
Capitalization	250	-0.0007272	0.4946996	-5.569767	0.5997314
Size	252	12.28545	2.878337	0	16.76995
Real GDP Growth Rate	265	-2.666007	5.130486	-12.346408	8.561815
RER Appreciation	265	-7.591853	8.367959	-19.66703	3.526031
Inflation rate	265	12.0617	5.232376	6.034042	20.53127

Capitalization's mean drops from 13% to almost zero, from the negative side, in crises, which is an expected result because we expect less capital to support assets during crises compared to regular times. Size stays relatively stable, as it drops from 13.19742 to 12.28545 in

crises. It is the natural logarithm of a stock variable, i.e. “total assets;” hence its lack of fluctuation is logical. We cannot expect sudden evaporation and quick resurrection of an economy in a crisis episode, for this reason we don’t observe severe oscillations in size variable.

Thirdly, summary statistics of macroeconomic variables depicts the state of the economy in the big picture. As the table shows, real GDP growth rate of Turkey is 3.95% on average over this period. Growth rate drops to -2.66% during crises, which is by definition of crisis, the economy contracts during these periods and instead of growing the economy shrinks. The records of maximum growth are 13.75% in overall periods and 8.56% in crises. The latter high growth rate is due to the windows we used in our definition of crises and they might capture the recovery period’s high growth rates. RER appreciation data shows that Turkish currency’s value remains almost stable in real terms, as it grow infinitesimally by 0.43% throughout the span of 20 years, which is in line with our expectations. The possible explanation is the fact that Turkish-US CPI ratio changed in favor Turkish currency so that negative trend of its exchange rate is compensated for. This RER appreciation turned negative during crises as it becomes -7.59% on average, which is in line with our expectations. Inflation rate’s average rises from 7.3% in overall to 12.06% in crises, which is as we expected because during negative periods prices are in the trend of increasing due to worsened expectations or usage of monetary policy as a recovery option.

5. Empirical Methodology and Results

5.0.1 Econometric Methodology

In order to analyze how different bank characteristics affect the lending performance of banks during crisis episodes, we run a regression where the dependent variable is change in loans, defined as the change in outstanding loan balance of bank i between quarter $t-1$ and t . We aim to explain bank i 's change of loans in period t by bank level variables, macro level variables and dummies of ownership and crisis.

Before making the distinction of crisis-period performance, we investigate what each variable captures and what their expected directions are. Bank-specific variables which we use in the analysis are liquidity, asset quality, profitability, capitalization and size. The definition of these variables are as follows: Liquidity is the ratio of liquid assets to total assets, capitalization is the ratio of equity over total assets, asset quality is the ratio of nonperforming loans over total loans, profitability is the ratio of net profit over total assets and finally size is the natural logarithm of total loans. Briefly, we expect liquidity, capitalization, profitability and size to be positively correlated with the change in loans, and asset quality to be negatively correlated with change in loans. More detailed analysis of what these variables capture and what determines their signs are explained in the subsequent paragraph. The description of the data used in the paper is given in the appendix.

Liquidity captures how the amount of liquid assets of a bank affects its lending performance. We expect a positive sign since if a bank owns more assets which can be turned into cash, it has more flexibility and freedom of action in regards to the decision of increasing its loans. Asset quality, which is defined as nonperforming loans over total loans, indicates how

much of a bank's assets are problematic. Therefore, it captures nonperforming loans' repressive effect on lending and its sign is expected to be negative. Profitability captures how bank's ability to make relatively more or less profits affects its lending behavior. Its sign is expected to be positive because a bank's ability to make larger profits is an indicator of the quality of its system, which will enable it to increase its lending. Highly productive banks also have a loyal and qualified clientele who are the potential future debtors — a reliable foundation of loan expansion. Capitalization captures how bank's capital-asset ratio affects its lending behavior. We expect a positive correlation between capitalization and loan expansion because if a bank has more capital to back its lending, it will be safer and more confident to issue more loans. Finally, size captures how largeness of a bank affects its lending behavior. Its sign is expected to be positive because larger banks are assumed to have more sources to generate new loans. Also their reputation and popularity will be higher, which will attract more debtors. In addition, they have the management excellence to distinguish low quality and high quality clientele, and to find which area has more return. These characteristics render a higher feasibility, productivity and motivation to expand lending.

Macroeconomic variables which we control for are growth rate of real GDP, RER appreciation and inflation rate. The definitions of these variables are as follows: Firstly, real GDP growth is constructed as the growth rate of real GDP between identical quarters of two consecutive years, which measures annual GDP growth at a quarterly frequency. Secondly, RER appreciation is calculated through growth rate formula applied to quarterly RER values. Thirdly, inflation rate is calculated as the quarterly growth rate of the consumer price index. Real GDP growth captures how the economy's general condition affects banks' lending behavior. Its sign is expected to be positive as loans are expected to expand during aggregate economy's expansion

period. Production and consumption increases during expansion periods, and loans are necessary for both investment and consumption expenditures. For this reason a positive correlation is expected. RER's definition utilized in this paper indicates the real value of Turkish Lira in terms of US Dollar. Then we further apply growth formula for RER to obtain the ultimate variable. The expected sign of the variable is ambiguous because there are two different channels through which RER affects banks' lending behavior. The first channel states that RER appreciation indicates the good status of economy; hence it is positively correlated with an increase in lending. According to the opposite channel, RER appreciation is also an indicator of relative prices of Turkish goods, and its increase will reduce the demand for Turkish goods. Hence, profitability of Turkish firms will decrease. Ultimately, this will decrease their loan demand, as a result RER appreciation will negatively affect banks' lending. The dominating channel would determine the direction of RER appreciation's effect, and its sign is left ambiguous for the analysis. Lastly, inflation rate captures how the change of prices in the economy affects bank's lending decision. Its sign is normally expected to be negative because it indicates a negative economic atmosphere where both loan supply and demand decrease. However as the dependent variable that we use is nominal, the inflation rate captures the nominal trend in the change of loans and its sign can be positive, reflecting this effect.

Three dummies are constructed for the regression analysis. Two of them are for foreign and state ownership and one for crisis periods. The crisis dummy is constructed to capture the dates of financial crises that the Turkish economy experienced. We identify crisis periods as the second quarter of 1994, the fourth quarter of 2000, and the first quarter of 2001. We added t-1 and t+1 period windows and constructed the crisis dummy. The crisis dummy captures the effect of the economy's state of being in a crisis on banks' lending behavior. We expect it to be

negative because banks are expected to reduce their loans during crises. The logic behind is the fact that the supply of loans becomes less feasible during crises. In crisis periods, it will be more difficult for banks to find resources to back up their lending. Moreover, the return of their loans is also more dubious during crises. Debtor will more likely be less qualified and more risky. For this reason, not only banks do not have the option of increasing their lending, but also their motive to expand loans decreases due to bad economic conditions. Furthermore, due to the negative situation of the economy, the demand for loans also decreases. Hence we expect a negative sign for the crisis dummy.

The foreign ownership dummy takes the value of 1 if the bank is a foreign subsidiary or branch, otherwise it is zero. It captures the effect of being owned by foreign capital on the bank's lending behavior. It will be utilized in the interacted form to crisis dummy and it will capture the additional effect of being a foreign bank on lending expansion during crises. We cannot use foreign dummy alone due to fixed effects panel data regression's limitations. The expected sign of this interaction term is ambiguous. It can be positive if foreign banks increase their loans through their usage of internal lending channels with their parental bank in order to finance their loans during crisis times. It can also be negative if foreign banks tend to decrease their loans by selecting more advantageous countries when an economy enters a crisis.

The state dummy takes the value of 1 if the bank is owned by the state, otherwise it is zero. It captures the effect of being a state-owned bank on lending behavior. Similar to foreign dummy, this effect cannot be tested with fixed effects regression. We use this dummy in interaction with the crisis dummy. This interaction term captures the additional effect of being a state-owned bank during crisis episodes. Its expected sign is ambivalent. It can be positive if state banks increase their lending during crises through their sophisticated credit channels in

diverse conditions. On top of the feasibility advantage, the demand for state banks' loans is also high as they are perceived safe and reliable. It can also be negative if state banks reduce their loans through acting rather more careful during crises as they are the backbone of the economy.

We construct four questions about banks' different lending behavior during crises: (i) Do banks decrease their lending during crisis periods? The expected answer would be affirmative since the economy slows down during crises and finding sources for their lending becomes harder for banks. Their credit channels get scarcer and narrower, for this reason they cannot expand or even maintain their level of loans. Also the risk of low quality loans rises during negative periods, which makes increasing loans more risky and costly.

(ii) The second question is, how will be the credit behavior of foreign banks during crises? Two opposing answers are possible. The first states that they are less correlated to the negative shocks because they have the option of relying on parental support. However, domestic banks are expected to decrease their loans during crises. During crisis times, domestic banks have limited resources and cannot expand their lending; however foreign banks can use their internal channels with the parent bank in order to finance their loans; hence they can increase their lending behavior in crisis times. In this regard, we can say that they alleviate the crisis as they supply funds to the economy when the resources are scarce. The opposite answer claims that foreign banks decrease their loans by choosing more advantageous markets. For this reason when an economy is stricken by a crisis, its risk rises and its efficiency decreases; hence foreign banks will prefer to invest in another more efficient and less risky economy.

(iii) The third question is about the lending behavior of state banks during crises. There are again two opposing views. The first view states that they reduce their lending less during crisis times because they are large and highly trusted institutions; to put it differently they are the

“backbones of the banking system” in Turkey. They are expected to possess solid credit sources which can back their lending expansion even in negative periods. They are expected to serve the role of stabilizing agent during crisis times by providing less costly and more trustworthy loans. Their large size of assets and high liquidity renders expansion of loans even if the aggregate sources of the economy are scarce. The opposite view defends that, these large and liquid banks will have to act carefully during crises and as a result they will reduce their risk by decreasing their lending during crises.

(iv) Lastly, each bank-specific characteristic is expected to affect a bank’s credit performance differently during crisis periods: Liquidity’s interaction with crisis has an ambivalent expected sign. It can be positive if more liquid banks have more assets which they can turn into cash and this helps them to increase their lending safely. Nevertheless, it can also be negative if as a liquid and healthy bank, it can aim to minimize risk during negative periods by decreasing its lending. Asset quality is defined negatively, for this reason its interaction term with crisis dummy is expected to affect lending negatively. The intuition here is the high number of nonperforming loans leads banks to operate more carefully and this forces them to cut back their lending. Profitability’s interaction with crisis is expected to affect loan growth positively because banks that make more profit are perceived healthier and these banks are more prone to enlarge these lending channels from which they generate their profits. Capitalization’s interaction with crisis is expected to affect bank’s lending positively because if bank’s assets are supported more strongly by its capital, it will more easily expand its loans. Finally the expected sign of bank size’s interaction with crisis is ambiguous. It can increase bank’s loan growth positively because the more assets a bank has, the larger credit channel it operates. The opposite view states that these healthy banks will take less risk in crisis periods by reducing their loans.

In order to test these hypotheses, we run one benchmark regression and six extensions of this benchmark regression with interaction terms. We use fixed effects as the estimation method for our panel data. This way we estimate time-invariant bank specific effects as fixed parameters. We estimate the following fixed effects (FE) model for the benchmark model:

$$CREDIT_{it} = \alpha + \beta_1 BANKSPECIFIC_{it} + \beta_2 MACRO_t + \beta_3 CRISIS_t + \mu_i + \varepsilon_{it} \quad (1)$$

where

$CREDIT_{it}$ is the credit change of bank i in quarter t ;

α is the intercept term;

$BANKSPECIFIC_{it}$ is the matrix of bank specific explanatory variables

$MACRO_t$ is the matrix of macroeconomic variables

$CRISIS_t$ is the crisis dummy

μ_i is the unobserved, panel level fixed effect

ε_{it} is the idiosyncratic error, $\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2)$;

β_1, \dots, β_3 are the coefficient vectors

$i: 1, \dots, N$ where N is the number of individual banks

$t: 1, \dots, T_i$ where T_i is the number of quarters

We then run the following regressions in order to check bank characteristics' effect on credit performance during crisis:

$$CREDIT_{it} = \alpha + \beta_1 BANKSPECIFIC_{it} + \beta_2 MACRO_t + \beta_3 CRISIS_t + \beta_4 CRISIS_t * CHARAC_{it} + \mu_i + \varepsilon_{it} \quad (2)$$

where

$CREDIT_{it}$ is the credit change of bank i in quarter t ;

α is the intercept term;

$BANKSPECIFIC_{it}$ is the matrix of bank specific explanatory variables

$MACRO_t$ is the matrix of macroeconomic variables

$CRISIS_t$ is the crisis dummy

$CHARAC_{it}$ is the matrix of interaction terms

μ_i is the unobserved, panel level fixed effect

ε_{it} is the idiosyncratic error, $\varepsilon_{it} \sim IID(0, \sigma_\varepsilon^2)$;

β_1, \dots, β_4 are the coefficient vectors

$i: 1, \dots, N$ where N is the number of individual banks

$t: 1, \dots, T_i$ where T_i is the number of quarters

5.0.2 Results

The estimation results are given in Tables 5.1 and 5.2. Table 5.1 shows the results for the benchmark model where change in credit is explained by bank-specific control variables, macroeconomic variables and the crisis dummy. Among bank-specific variables, liquidity, asset quality, profitability and size are statistically significant explanatory variables. Only capitalization is not significant. Liquidity has a positive coefficient and it indicates that if a bank has a higher amount of liquid assets with respect to its total assets, it tends to give more loans, which is an expected result. Asset quality, being inversely defined, has a negative coefficient,

which is the expected direction of its sign. Profitability has a positive coefficient which is in line with our expectations. Size is highly significant and positive, as expected, affirming that a bigger bank has a larger capacity to give loans.

Among the macroeconomic variables, real GDP growth, RER appreciation and inflation rate are statistically significant. Real GDP growth is significant at the 1% level and the coefficient is positive, verifying that when the economy grows, banks also tend to lend more. RER appreciation is also significant at the 1% level and the coefficient is negative. This indicates that the second channel is dominating, in other words RER appreciation indicates higher relative prices of Turkish goods, which causes a decrease in firm's profitability and their demand of loans. In addition, inflation rate is significant and its coefficient is positive, of which the nominal trend is responsible. The crisis dummy is significant at the 1% level and it has a negative coefficient. As expected, banks reduce their lending during crisis periods.

Table 5.2 shows the results for the regressions with the interaction terms, which are the crisis dummy and its interaction term with foreign dummy, state dummy, liquidity, asset quality, profitability, capitalization or size. These interaction terms are shown in columns (1) to (7) respectively. As foreign dummy's interaction with crisis dummy is significant and the coefficient is positive, it is shown that foreign ownership of a bank affects its credit behavior positively during a crisis. This is in line with the first expectation that we have constructed in the econometric methodology section: foreign banks decrease their loans less than domestic banks during crisis times.

Table 5.1: Benchmark Regression Results

Variables	(1)
Liquidity	1934.90** (2.10)
Asset Quality	-72.62** (-2.49)
Profitability	2953.94** (2.06)
Capitalization	543.58 (0.90)
Size	225.34*** (4.01)
Real GDP Growth	20.89*** (3.88)
RER Appreciation	-24.34*** (-3.90)
Inflation Rate	10.28** (2.15)
Crisis	-312.19*** (-3.29)
Constant Term	-2987.05*** (-3.48)
Observations	2447
Number of groups	53
R squared	0.2864

Notes: Change in loans is measured in thousands of TL, robust t-statistics in parenthesis, * significant at 10%, ** at 5%, *** at 1%,

Almost none of the explanatory variables differ from their benchmark results in terms of significance and sign. The coefficient of the crisis dummy almost doubles in absolute value, which shows that crisis is experienced more deeply by domestic banks and they reduce their lending more.

State ownership dummy interacted with the crisis is highly significant at 1% level and negative. This result suggests that the second channel dominates, in other words state banks decrease their lending even more during crises, compared to other banks. The reason of such behavior might be the fact that state banks are the backbone of the banking sector in Turkey and they act rather careful during these contraction episodes in order to minimize the risk.

Table 5.2: Regression Results for Interaction term regressions

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Liquidity	1888.84** (2.07)	1870.73** (2.09)	1897.49** (2.05)	1934.72** (2.11)	1934.26** (2.10)	1937.12** (2.11)	1700.10* (1.90)
Asset Quality	-74.36** (-2.52)	-71.69** (-2.51)	-72.67** (-2.48)	-73.88** (-2.47)	-72.77** (-2.49)	-73.09** (-2.35)	-72.10** (-2.45)
Profitability	2825.77** (2.02)	2836.61** (2.03)	3015.37** (2.06)	2946.57** (2.05)	2777.30* (1.92)	2953.12** (2.06)	2858.33* (1.99)
Capitalization	548.01 (0.90)	532.92 (0.90)	521.42 (0.86)	585.33 (0.91)	555.16 (0.92)	561.86 (0.79)	519.63 (0.86)
Size	225.12*** (4.01)	226.27*** (4.01)	229.33*** (3.96)	225.51*** (4.02)	224.90*** (4.01)	225.32*** (4.01)	247.87*** (4.14)
Real GDP Growth	20.88** (3.87)*	20.87*** (3.87)	20.94*** (3.87)	20.90*** (3.88)	20.78*** (3.86)	20.89*** (3.88)	20.77*** (3.84)
RER Appreciation	-24.22*** (-3.91)	-23.98*** (-3.87)	-23.99*** (-3.91)	-24.37*** (-3.90)	-24.28*** (-3.89)	-24.36*** (-3.89)	-22.15*** (-3.73)
Inflation Rate	9.98** (2.09)	10.62** (2.20)	10.87** (2.23)	10.39** (2.15)	10.40** (2.18)	10.32** (2.14)	14.62*** (2.82)
Crisis	-502.79*** (-3.63)	-228.39** (-2.33)	-385.43*** (-3.02)	-337.36*** (-3.22)	-355.48*** (-3.45)	-304.18** (-2.56)	1786.51*** (4.32)
Crisis * Foreign	423.76*** (3.11)						
Crisis * State		-1216.59*** (-5.19)					
Crisis * Liquidity			5187.88 (1.55)				
Crisis * Asset Quality				851.93 (0.49)			
Crisis * Profitability					1591.18 (1.50)		
Crisis * Capitalization						-84.99 (-0.12)	
Crisis * Size							-165.44*** (-4.74)
Constant Term	-2975.94*** (-3.47)	-2994.88*** (-3.46)	-3043.67*** (-3.45)	-2995.22*** (-3.48)	-2979.38*** (-3.47)	-2989.54*** (-3.46)	-3315.55*** (-3.62)
Observations	2447	2447	2447	2447	2447	2447	2447
Number of groups	53	53	53	53	53	53	53
R squared	0.2862	0.2864	0.2870	0.2865	0.2863	0.2864	0.2941

Notes: Change in loans is measured in thousands of TL, robust t-statistics in parenthesis, * significant at 10%, ** at 5%, *** at 1 %

They tend to be large banks, for this reason state dummy's interaction has similar results with size interaction. These large banks give larger amount of loans during expansion times and the opposite happens during contraction times, they decrease lending dramatically.

Thirdly, among bank-specific characteristics' interaction with the crisis dummy, only size interaction is significant at the 1% and the coefficient is negative. This finding indicates that larger banks are healthier banks which aim to minimize the risk by reducing lending during crisis periods. All other interaction terms are insignificant, which means that there is no evidence of these bank-specific variables' determining role on bank lending during crises.

The econometric results presented in this section show that bank lending decreases during crisis periods; in addition foreign banks reduce their loans less; whereas state banks and large banks decrease their lending more during crises.

6. Robustness Analysis

6.0.1 Inclusion of the Global Crisis of 2008

The crises that have been analyzed in the main analysis are financial crises that originated in Turkey. In order to check whether our results hold when we include the 2008 global crisis in our analysis, we construct a new crisis dummy that accounts for the 2008 crisis together with the crises of 1994 and 200-2001.

The 2008 crisis is different from the other two crises since it originated in the US and it globally affected almost all economies around the world, including Turkey. In order to include the 2008 crisis in our analysis, we determine the first period in which the Turkish economy was affected by this crisis. For this purpose, we use RER data and we detect that the third quarter of 2008 is the period when the deepest RER depreciation is observed in Turkey. As we did before, we add plus and minus one period window to the third quarter of 2008 and extend our original crisis dummy to include these three quarters. With this newly created crisis dummy, we run our benchmark regression and regressions with interaction terms. The results are presented in table 6.1.

The benchmark results show that all variables preserve their significance and signs as in our original regression. The magnitudes of the coefficients are very similar to the original regression. The crisis dummy is significant at 1% level in both regressions. These robustness results allow us to generalize the findings we obtained in our main analysis. We can safely reach the conclusion that bank lending decreases in both local and global crises.

After re-estimating the benchmark model, we run regressions with interaction terms employing our new crisis dummy. The results are shown in table 6.1. The interaction term regressions show that foreign ownership interaction, state-ownership interaction and size interaction terms maintain their significance and sign. This allows us to generalize our findings that foreign banks reduce their loans less than domestic banks during both local and global crises. Moreover, we can safely generalize that state banks and bigger banks decrease their lending more during both local and global crises. In addition, liquidity's and profitability's interaction terms also gain significance. Liquidity interaction's coefficient is negative whereas profitability interaction's is positive.

Benchmark and interaction term regressions with the new crisis dummy that contains not only local crises but also global crisis permit us to generalize our findings to a more general framework. The results which we found in section four is not caused by a local-only factor, these results are general effects observed during both locally-originated and foreign-originated crises.

Table 6.1: Regression results with the crisis dummy including the 2008 crisis

Variables	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Liquidity	2089.98** (2.29)	2013.69** (2.24)	2032.95** (2.29)	2250.21** (2.39)	2081.44** (0.2871)	2044.67** (2.25)	2085.93** (2.29)	1610.89* (1.92)
Asset Quality	-72.091** (-2.47)	-73.19** (-2.49)	-71.79** (-2.48)	-72.82** (-2.46)	-73.13** (-2.48)	-73.25** (-2.49)	-71.53** (-2.29)	-76.26** (-2.52)
Profitability	2980.65** (2.08)	2804.01* (1.99)	2988.12** (2.10)	2862.13** (2.03)	2986.29** (2.07)	1821.93 (1.33)	2977.38** (2.07)	2483.60* (1.80)
Capitalization	578.70 (0.96)	579.41 (0.95)	571.74 (0.96)	602.36 (0.98)	618.86 (1.00)	615.62 (1.02)	558.68 (0.78)	534.72 (0.89)
Size	218.84*** (3.98)	218.82*** (3.99)	219.11*** (3.97)	215.59*** (3.95)	219.28*** (3.99)	219.38*** (4.00)	218.93*** (3.99)	253.26*** (4.22)
Real GDP Growth	15.71*** (3.50)	16.05*** (3.56)	15.44*** (3.40)	12.68*** (2.97)	15.94*** (3.50)	15.24*** (3.49)	15.76*** (3.52)	14.99*** (3.47)
RER Appreciation	-25.32*** (-3.99)	-25.19*** (-4.01)	-24.99*** (-3.96)	-25.24*** (-4.00)	-25.38*** (-3.99)	-25.29*** (-3.99)	-25.30*** (-3.98)	-22.36*** (-3.74)
Inflation Rate	9.57** (2.14)	9.31** (2.09)	9.03** (2.04)	7.74* (1.82)	9.75** (2.16)	10.16** (2.26)	9.55** (2.12)	7.67* (1.83)
Crisis	-263.54*** (-3.69)	-437.03*** (-3.86)	-198.39*** (-2.83)	-127.95** (-2.09)	-288.14*** (-3.83)	-389.60*** (-3.97)	-272.50** (-2.45)	2006.85*** (5.17)
Crisis * Foreign		368.33*** (2.71)						
Crisis * State			-788.42*** (-5.09)					
Crisis * Liquidity				-3473.67*** (-3.27)				
Crisis * Asset Quality					607.06 (1.36)			
Crisis * Profitability						4353.74*** (3.30)		
Crisis * Capitalization							84.91 (0.12)	
Crisis * Size								-175.47*** (-5.85)
Constant Term	-2875.80*** (-3.44)	-2865.96*** (-3.43)	-2869.96*** (-3.41)	-2814.30*** (-3.39)	-2888.77*** (-3.44)	-2863.85*** (-3.44)	-2874.23*** (-3.43)	-3292.11*** (-3.65)
Observations	2447	2447	2447	2447	2447	2447	2447	2447
Number of groups	53	53	53	53	53	53	53	53
R squared	0.2868	0.2853	0.2851	0.2884	0.2871	0.2876	0.2868	0.3023

Notes: Change in loans is measured in thousands of TL, robust t-statistics in parenthesis, * significant at 10%, ** at 5%, *** at 1 %

6.0.2 Separation of Foreign Currency and Turkish Lira-denominated Loans

As a second robustness check we separate foreign currency-denominated loans from Turkish Lira denominated loans in order to check whether our findings still holds if only foreign currency-denominated or Turkish Lira-denominated loans is the main interest of the question. For this reason we re-estimate our benchmark and interaction term regressions after changing our dependent variable to only change of foreign currency-denominated loans or only change of Turkish-Lira denominated loans. Table 6.2 presents the results of benchmark and interaction term regressions with foreign currency-denominated loans.

We observe that two variables, i.e. liquidity and profitability, become insignificant in this robustness analysis. However, the rest of the variables preserve their significance. Our main variable of interest, in other words the crisis dummy maintains its significance at the 1% level. These results allow us to generalize our findings about drop in the bank lending during crises to more specifically drop in foreign currency-denominated lending. To put it differently, what we observe in the big picture of total loans is also verified in the smaller set of foreign currency-denominated loans.

We also run interaction term regressions with foreign currency-denominated loans as the dependent variable and the results are reproduced in table 6.2. All interaction terms preserve their significance. The maintenance of all significant interaction terms and their signs mean, foreign ownership, state ownership and size of a bank have the same effect on foreign currency-denominated loans, which they had on total loans. This allows us to generalize our findings about determinants of bank lending during crises to the smaller case of foreign currency-denominated lending during crises.

Table 6.2: Regression results with foreign currency-denominated loans

Variables	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Liquidity	245734.87 (1.09)	234263.03 (1.04)	229626.65 (1.04)	237142.19 (1.04)	245773.12 (1.09)	245672.38 (1.09)	246587.52 (1.09)	192670.03 (0.85)
Asset Quality	-19401.64** (-2.67)	-19746.137*** (-2.68)	-19213.086*** (-2.69)	-19449.799** (-2.65)	-19375.743** (-2.66)	-19402.412** (-2.67)	-19556.92** (-2.53)	-19297.952** (-2.58)
Profitability	880599.81 (1.63)	850095.87 (1.59)	850536.44 (1.59)	894899.82 (1.63)	880780.38 (1.63)	872580.4 (1.53)	880316.15 (1.62)	858871.51 (1.59)
Capitalization	83186.624 (0.65)	80599.824 (0.62)	82789.282 (0.66)	79507.829 (0.62)	82418.906 (0.62)	83434.255 (0.65)	89623.177 (0.53)	77645.579 (0.61)
Size	71521.41*** (3.55)	71444.773*** (3.55)	71771.074*** (3.55)	72459.263*** (3.51)	71518.045*** (3.55)	71500.31*** (3.54)	71531.617*** (3.55)	76592.773*** (3.63)
Real GDP Growth	9878.54*** (3.55)	9879.1928*** (3.55)	9872.5965*** (3.55)	9891.3539*** (3.55)	9878.4031*** (3.55)	9873.7137*** (3.54)	9875.5308*** (3.55)	9854.3472*** (3.54)
RER Appreciation	-11862.96*** (-3.84)	-11833.229*** (-3.84)	-11771.078*** (-3.82)	-11779.952*** (-3.86)	-11862.147*** (-3.84)	-11860.025*** (-3.83)	- 11867.314*** (-3.84)	-11368.416*** (-3.78)
Inflation Rate	4037.90** (2.04)	3949.5632* (1.99)	4135.5608** (2.09)	4182.6762** (2.09)	4036.0214** (2.04)	4042.5778** (2.05)	4059.9424** (2.05)	5013.7633** (2.43)
Crisis	-111683.17*** (-3.09)	-157076.86*** (-3.30)	-90337.21** (-2.54)	-128863.01*** (-2.78)	-111022.46*** (-2.94)	-113645.14*** (-3.17)	-109808.27*** (-2.70)	362456.74*** (3.24)
Crisis * Foreign		101228.68*** (2.79)						
Crisis * State			-310870.53*** (-5.31)					
Crisis * Liquidity				1215837.3 (1.22)				
Crisis * Asset Quality					-22450.141 (-0.06)			
Crisis * Profitability						72358.225 (0.18)		
Crisis * Capitalization							-21003.01 (-0.14)	
Crisis * Size								-37370.154*** (-3.65)
Constant Term	-933577.64*** (-3.07)	-929964.35*** (-3.07)	-936143.97*** (-3.07)	-947131.21*** (-3.05)	-933429.42*** (-3.07)	-933165.69*** (-3.06)	-934730.56*** (-3.07)	-1007509.2*** (-3.17)
Observations	2447	2447	2447	2447	2447	2447	2447	2447
Number of groups	53	53	53	53	53	53	53	53
R squared	0.1581	0.1576	0.1584	0.1583	0.1581	0.1581	0.1582	0.1603

Notes: Change in loans is measured in thousands of TL, robust t-statistics in parenthesis, * significant at 10%, ** at 5%, *** at 1 %

Secondly, we perform the same robustness check for Turkish Lira-denominated assets as the dependent variable. The results of these benchmark and interaction term regressions are reproduced in Table 6.3. The Turkish Lira benchmark results show that this time all explanatory

variables except inflation preserve their significance and sign. Specifically the crisis dummy maintains its significance at the 1% level.

Table 6.3: Regression results with Turkish Lira-denominated loans

Variables	(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Liquidity	1709719.1** (2.30)	1674079.8** (2.26)	1661467.3** (2.29)	1680865.9** (2.25)	1708857.2** (2.30)	1708518.8** (2.29)	1718617.9** (2.33)	1528172.1** (2.12)
Asset Quality	-51538.454** (-2.48)	-52608.686** (-2.51)	-50973.636** (-2.50)	-51700.155** (-2.48)	-52122.021** (-2.48)	-51553.212** (-2.48)	-53159.007** (-2.37)	-51183.701** (-2.43)
Profitability	2140832.3** (2.17)	2046066.3** (2.13)	2050778.1** (2.15)	2188850.1** (2.17)	2136763.8** (2.16)	1986784.8** (2.02)	2137871.9** (2.16)	2066494.8** (2.08)
Capitalization	357524.8 (1.05)	349488.44 (1.01)	356334.57 (1.07)	345171.84 (1.01)	374822.6 (1.05)	362281.61 (1.06)	424700.32 (0.96)	338567.61 (0.99)
Size	153093.81*** (4.14)	152855.71*** (4.13)	153841.66*** (4.13)	156242.99*** (4.09)	153169.76*** (4.14)	152688.38*** (4.13)	153200.28*** (4.14)	170444.09*** (4.29)
Real GDP Growth	10800.479*** (3.73)	10802.478*** (3.72)	10782.647*** (3.72)	10843.475*** (3.72)	10803.78*** (3.73)	10707.587*** (3.71)	10768.974*** (3.73)	10717.678*** (3.69)
RER Appreciation	-12674.301*** (-3.62)	-12581.921*** (-3.63)	-12399.057*** (-3.58)	-12395.555*** (-3.60)	-12692.714*** (-3.62)	-12617.84*** (-3.61)	-12719.693*** (-3.62)	-10982.336*** (-3.32)
Inflation Rate	5488.7854* (1.80)	5214.3367* (1.71)	5781.3121* (1.86)	5974.9108* (1.92)	5531.2206* (1.80)	5578.5517* (1.83)	5718.7822* (1.84)	8827.4221** (2.65)
Crisis	-200343.93*** (-3.34)	-341367.52*** (-3.66)	-136402.54** (-2.12)	-258031.79*** (-3.15)	-215230.86*** (-3.16)	-238031.92*** (-3.44)	-180776.34** (-2.55)	1421797.9*** (4.62)
Crisis * Foreign		314485*** (3.03)						
Crisis * State			-931206.15*** (-5.02)					
Crisis * Liquidity				4082638.7* (1.72)				
Crisis * Asset Quality					505834.15 (0.44)			
Crisis * Profitability						1389951.8* (1.90)		
Crisis * Capitalization							-219199.36 (-0.55)	
Crisis * Size								-127851.9*** (-5.09)
Constant Term	-2027494.4*** (-3.57)	-2016269.1*** (-3.56)	-2035181.8*** (-3.56)	-2073005.7*** (-3.55)	-2030834*** (-3.58)	-2019581.2*** (-3.56)	-2039527*** (-3.56)	-2280431.5*** (-3.74)
Observations	2447	2447	2447	2447	2447	2447	2447	2447
Number of groups	53	53	53	53	53	53	53	53
R squared	0.2729	0.2731	0.2729	0.2736	0.2729	0.2728	0.2729	0.2820

Notes: Change in loans is measured in thousands of TL, robust t-statistics in parenthesis, * significant at 10%, ** at 5%, *** at 1%

This maintenance of significance means that crisis still has the same explanatory power on Turkish Lira-denominated loans. This allows us to generalize that bank lending drop that we find during crises can be generalized to the smaller set of Turkish Lira-denominated loans. When we examine interaction term regression results, again we see that all interaction terms that were significant in the original regression are still significant and have the same sign.

To put it differently foreign ownership, state ownership and amount of total assets have the same effects on bank lending during crises whether we look at total loans or Turkish Lira-denominated loans. Moreover, liquidity and profitability became significant at 10% level. In short, the results of benchmark and interaction term regressions with Turkish Lira-denominated assets permit us to generalize safely our findings in the overall loans case to more specific Turkish-Lira denominated loans case.

To sum up, these three robustness analyses allow us to say that our main analysis in the previous section about banks' lending behavior during crises is robust and it holds if we change the definition of crisis or the denomination of loans. Our main findings that banks reduce their loans during crises holds whether the crisis is expanded to include 2008 global crisis, or whether the loans is limited to only foreign currency or Turkish lira denominated loans. Similarly the implications of interaction term regressions can be safely generalized too as they are found to be robust. Hence, we can say that foreign banks decrease their loans less than domestic banks, state banks reduce their lending more than private banks and bigger banks decrease their loans more than smaller banks during crises, no matter what crisis definition is used and no matter what loan denomination is used.

7. Conclusion

This paper analyzes the effects of different bank-specific variables on bank lending in Turkey, focusing on their role during the crisis periods of 1994 and 2000-2001. The results of the econometric analysis show that banks reduce their lending during crisis periods, controlling for different bank characteristics and macroeconomic variables. Furthermore, foreign banks reduce their lending less during crises, which is explained by their internal credit channels with their parent banks. On the other hand, state banks reduce their lending more than private banks in a crisis episode. Also, larger banks are found to cut back their lending more during crises. These findings are robust to the inclusion of the 2008 crisis in the analysis and limiting the dependent variable to only foreign currency and only Turkish Lira-denominated loans.

The results show that foreign banks alleviate the negative effects of crises on the economy by giving more loans. This finding suggests that internationalization of banking system of a country will diversify internal characteristics of banks operating in a specific market. Hence, their reaction to crises will be diversified too, which will prevent an aggregate negative credit response to a negative shock. In other words, as each foreign bank's home country and parent institution have different characteristics and liabilities, the magnitude of their response to host country events will be diversified, which will help the bank system to avoid decreasing loans as a whole. While domestic banks and some foreign banks decrease loans as a response to crisis, a number of foreign banks whose parent institution has abundant resources, will use these opportunities to supply loans to the crisis-struck economy. Our findings imply that state banks

and large banks tend to deepen the crisis. However, state banks and large banks are also the major component of an economy which drives the growth. Their relative negative effect during crises should be further investigated together with their merits during the expansion cycles of the economy. The reasons behind these results deserve further analysis and should be the subject of future research.



8. Appendix

Table 8.1 Data description

Variable	Source	Description
Bank-level series		
Change of Loans	The Banks Association of Turkey (TBB)	Private non-financial sector loans denominated in all currencies. It is measured in thousands of TL
Liquidity	TBB	Liquid assets over total assets Interest rate.
Asset Quality	TBB	Non-performing loans over total loans.
Profitability	TBB	Net income over total assets.
Capitalization	TBB	Capital over total assets.
Size	TBB	Natural logarithm of total assets.
Foreign Dummy	TBB	Foreign bank subsidiary or branch
State Dummy	TBB	Domestic state-owned (majority) bank.
Macro Series		
Growth Rate of Real GDP	International Monetary Fund (IMF)	Annual growth rate of real GDP
Inflation Rate	IMF	Quarterly growth rate of prices
RER Appreciation	IMF	Quarterly growth rate of RER

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