Sovereign Risk and Bank Lending: Evidence from 1999 Turkish Earthquake

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Abstract

We investigate the effect of sovereign risk on banks' credit provision. We use the August 1999 Marmara Earthquake as an unanticipated exogenous fiscal shock that led to an increase in government's default risk. We find that banks with higher exposures to government bonds before the earthquake suffered a bigger shock to their balance sheet and decreased lending more than the banks with lower exposures, after the earthquake. A bank that holds 75 percent of its total assets in government bonds decreases lending to private sector 6 percent after the earthquake relative to pre-earthquake mean. Our estimates explain 58 percent of the actual decline in loan provision during July-October 1999.

JEL: E32, F15, F36, O16

Keywords: banking crisis, bank balance sheets, lending channel, public debt, credit supply

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I Introduction

Sovereign governments mostly borrow from domestic residents (Aguiar and Amador (2013), Tomz and Wright (2013), and Reinhart and Rogoff (2009)). By lending to their own sovereigns, domestic financial institutions expose themselves to sovereign risk. As sovereign default risk increases and sovereign ratings get downgraded, the net worth of banks who hold sovereign debt goes down (Gennaioli, Martin, and Rossi (2014b), Holmstrom and Tirole (1993)). Such an increase in sovereign risk constitutes a direct balance sheet shock to the banks who hold sovereign debt and reduces the eligibility of sovereign bonds as collateral to secure funding. Sovereign risk can also increase endogenously due to weak banks. Governments can backstop the financial system as a lender of last resort, and recapitalize banks post financial crises. Such bailouts can increase sovereign risk (Acharya and Schnabl (2014)). Both channels can underline the well known fact of the coincidence of sovereign crises and banking crises (Reinhart and Rogoff (2009)). The resulting macroeconomic outcome regardless of the channel is a recession leading to low demand from corporate sector for loans.

To this date, there has been no empirical evidence on this mechanism, where an exogenous shock to banks' balance sheet due to heightened sovereign risk resulting in lower liquidity provision by banks to the private sector.[1] The difficulty in obtaining this evidence lies in three observed patterns in the data. First and foremost, the shock to the bank balance sheets is never exogenous and mostly anticipated. If banks cause the increase in sovereign risk or banks anticipate a government default then they can actively manage their balance sheet by buying/selling government bonds and hence we cannot deduce the effect of government bonds on the balance sheet on lending when the value of such bonds go down. Second, the value of the existing government bonds may not change on the bank balance sheet even sovereign ratings go down if banks are recording all assets at the book value. In this case, the shock

[1] Using data from a wide array of past emerging market sovereign defaults, Gennaioli, Martin, and Rossi (2014b) shows a negative relation between bank lending and holdings of sovereign bonds during default episodes.

to the bank balance sheet may not be observed to the econometrician. Bank will change its behavior in terms of private sector lending given the lower value bonds, but the change in the value of the bonds may not be observed on the balance sheet. The econometrician will erroneously attribute this change in lending to another factor or simply conclude that there is no effect of increased sovereign risk on lending through banks' holdings of government bonds. And last but not least, if the troubles in the banking sector and/or increased sovereign risk lead to a recession and increased uncertainty, the demand for credit by private sector will go down. Since we observe in the data equilibrium loan provision, the decline in loans can simply be due to this recessionary environment rather than the deterioration in bank balance sheets.

This paper investigates the link between government bonds, banks and credit market disruptions using a natural experiment that solves the aforementioned identification issues. Our experiment allows us to investigate the link from government bond holdings to banks' balance sheet health and then to credit supply to real sector. Specifically, we investigate the effect of government debt on banks' performance and credit provision, using confidential portfolio data for the universe of banks in Turkey between 1997–2012. We use the 1999 Marmara Earthquake as an unanticipated exogenous fiscal shock that led to fiscal distress. The earthquake provides us with a fiscal shock that affects the sovereign risk without affecting the general macroeconomic condition of the country. There was also no banking crisis prior to the earthquake. Using a differences-in-differences methodology, we find that banks' with higher exposures to government debt before the earthquake suffered a bigger shock to their net worth and decreased lending more than the banks with lower exposures. Our estimates will be identified from the double difference, i.e., the difference in lending after the earthquake between banks with low and high exposures to government debt before the earthquake. It is not possible that banks accumulate or run down government debt in expectation of the earthquake and hence the unanticipated nature of the shock helps us to rule out moral hazard and/or risk shifting stories in expectation of a default, which is the key problem in the literature.

Our identification strategy relies on the size and the unanticipated nature of the fiscal shock. In terms of the size of the fiscal shock, the Marmara earthquake is very significant. On August 17, 1999 and November 12, 1999, two big earthquakes (at a Richter Scale of 7.6 and 7.2, respectively) hit industrial heartland of Turkey, composed of cities such as Kocaeli, Sakarya, Duzce, Bolu, Yalova, Eskisehir, Bursa and Istanbul. The region's population share in country total is 25 percent and GDP share is 50 percent. Total cost of the disaster is estimated to be 20 billion USD, which is 11 percent of GDP as of 2000.[2] To put this event in context, the ratio of damaged buildings (including key industrial/chemical factories) is 4 times higher than 1995 Kobe earthquake and 12 times higher than 1994 Northridge earthquake. The Marmara Earthquake is listed in top ten in the U.S. Department of Commerce Significant Earthquakes database on all earthquakes recorded in history.

We start by showing the increased sovereign risk as a result of the earthquake. The spreads on government bonds go up and maturity gets shorter, indicating an increase in default risk. The government bonds decline in value and constitute a negative shock to banks' balance sheets; more so for the banks with high exposure to sovereign debt. To establish the mechanism from the reduced value of government bonds to a negative bank balance sheet shock, we proceed as follows. Bank balance sheets are at book value and hence the decline in the value of government bonds will not be measured by the existing government bond holdings that are not marked to market. To remedy this problem, we make use of a peculiarity of Turkish bank balance sheet accounting practices during that period, that is recording any loss from any asset in a separate line item called "valuation". We show that banks with higher exposure enter a loss into this item relative to the banks with lower exposure to such government bonds after the earthquake. Since we separately condition on non performing loans, this shows a direct negative shock to the net worth of the bank as a result of high exposure to government bond market.

Our results are statistically and economically significant. Our estimates imply that, a bank that holds 75 percent of its assets in government bonds decreases credit provision 2

[2]See Akgiray and Erdik (2004).

percent during regular times and 6 percent during earthquake relative to respective means. We measure credit provision by loans to assets so these are big affects (mean loans to asset ratio is 30 percent). The actual decline in loan provision is 3 percentage points during the earthquake period. A bank with mean bond holdings (20 percent of its assets) will decrease loan supply by 1.7 percentage points and hence our estimates can explant 58 percent of the actual decline in credit provision from July to October 1999, on average.

Although we use an exogenous fiscal shock, there are still other threats to identification. It can be the case that banks who hold more government securities on their balance sheets were affected from earthquake more since they lend in the earthquake region more, for example. This is not plausible in our case, given the extent of the region affected by the earthquake, where every bank has a big presence in terms of lending. Being the industrial and financial heartland of Turkey, the headquarters of 77 out of 81 banks were located in the Marmara Region, where the remaining were the state-owned banks with headquarters located in Ankara. Of course, it can still be the case that the customers of the banks with high exposure to government debt pre-earthquake, reduce their demand for credit more post-earthquake. Given the lack of a recession in the region and also countrywide, we feel that this is not likely. In fact investment demand must increase in the earthquake region given the higher expected return on the destroyed capital stock. It is possible of course that weak firms borrow from weak banks but we clean out these type of average effects by fixed effects.

In order to make sure that our results are not driven by a time varying bank specific demand effect, where banks with higher exposure to government holdings also face with lower demand in the aftermath of the earthquake for unobserved reasons, we proceed with two more analysis: First one is the use of foreign banks. For foreign banks we have their lending in Turkey and outside and we show that as a result of a balance sheet shock via holdings of Turkish bonds, these banks reduce their lending outside Turkey, where outside is defined as neighbourhood countries in Eastern Europe. We made sure there was not a major event in those countries at the time. Second analysis relies on data from the loan officer surveys. The benefit of these surveys is that we can find out changes to bank specific

customer demand. The caveat is that these are undertaken after our earthquake period so we will assume the information also applies to our period. From each bank we have the surveys on customer demand for every quarter, where the survey reports the changes in customer demand. We show that these reported changes move slowly from quarter to quarter and our bank level loan data is monthly. As a result we can account for the slow moving bank specific demand for each bank by bank-quarter fixed effects.

Finally, the exposure to government debt is not random. In general government bonds are the main source of liquidity and high quality collateral for banks.[3] Hence, sovereign debt is like any other assets with risk-return features and comove with other asset holdings. Though, government debt is also open to regulatory arbitrage and excessive leverage given the risk free nature of it.[4] More importantly, there might be unobserved bank characteristics that are correlated with bond holdings and these unobserved characteristics might affect bank performance upon the realization of any fiscal shock even the shock is unanticipated. To the extent that such characteristics are not varying over time, such as being a state owned bank or a small poorly capitalized bank, our bank-fixed effects framework will absorb them.[5] The time-varying characteristics, such as cash holdings and interbank balances, we control for explicitly. We also show that the characteristics that determine government bond holdings do not have any differential affect on government bond holdings before and after the earthquake. This exercise shows that even banks with low capital ratios hold more government debt, they did not increase their holdings in anticipation of the earthquake or during earthquake, as expected given the unanticipated nature of the earthquake. As long

[3]Holmstrom and Tirole (1998).

[4]See Broner Fernando and Ventura (2010) and Acharya and Steffen (2014). Using data from Bankscope on emerging market banks and defaults, Gennaioli, Martin, and Rossi (2014a) find support for government bonds providing liquidity, while Acharya and Steffen (2014) show support for a carry trade behavior of banks of different sovereigns in the European context. Angelini, Grande, and Panetta (2014) argue that, in the case of Italy, there was no build up in advance or during the period where spreads have risen on Italian bonds. There has been a growing literature on repatriation of public debt back home with heightened sovereign risk, meaning banks holding their own sovereign's debt (bank home-bias), in the light of the recent European crisis. See Brutti and Sauré (2013).

[5]Buch, Koetter, and Ohls (2013) show substantial heterogeneity in the sovereign bond holdings of German banks that can be explained by fixed bank characteristics (slow moving) such as being large and/or poorly capitalized.

as there are no systematic differential prior trends in our key outcome variables by high and low exposure banks pre-earthquake, our identification strategy will be valid. To verify this, we run placebo regressions with several fake earthquake dates, showing no prior trend difference in loan supply by high and low exposure banks.

We proceed as follows. Section 2 presents a brief review of the literature. Section 3 discusses the background in Turkey. Section 4 presents a conceptual framework. Section 5 lays out the identification methodology. Section 6 presents the data. Section 7 undertakes the empirical analysis and Section 8 concludes.

II Related Literature

We contribute to the broad literature that relates the sovereign debt crises to private sector access to credit. Arteta and Hale (2008), for example, find evidence of a decline in foreign credit over the period between 1984 and 2004 for 30 emerging markets in the aftermath of a sovereign debt crisis that these countries experienced. Borensztein and Panizza (2009) finds that probability of a banking crisis conditional on a sovereign default is much higher then the unconditional probability, whereas probability of default conditional on banking crisis is only slightly higher. Reinhart and Rogoff (2009) finds the opposite result that banking crises are the most significant predictors of defaults.

Our paper is specifically on the transfer of fiscal stress to real sector via the financial sector. The existing literature focuses on the rise in sovereign spreads and/or actual defaults as the sovereign shock. An increase in sovereign spreads and the higher correlation between sovereign CDS spreads and bank CDS spreads can be driven by other factors, which also drive bank fragility. As sovereign bonds yields raise and sovereign ratings deteriorate, cost of borrowing increases for banks as the value of key collateral, i.e. the sovereign bonds, drops. If the initial rise in spreads is not exogenous, in terms of anticipation and correlation to bank fragility, it will be hard to disentangle transmission from sovereign bond markets to banks' balance sheet health and their ability to supply credit.

In terms of the channel we are closer to the papers by Bofondi and Sette (2013) and Gennaioli, Martin, and Rossi (2014a). Both papers look at the effect of sovereign debt crises/defaults on lending to real sector. Bofondi and Sette (2013) interpret their finding on reduced credit supply as a "lender-of-last-resort" shock, since they do not find any differential results based on bank characteristics but rather they find a country effect. Gennaioli, Martin, and Rossi (2014a), on the other hand, find that banks who hold more government bonds during normal times for liquidity reasons cut lending more during defaults, providing evidence consistent with the balance sheet channel. Our paper provides causal evidence on the balance sheet channel and shows that the mechanism goes through balance sheet health to explain how banks with higher exposures to government debt reduce their credit supply during times of fiscal stress.

III Country Background

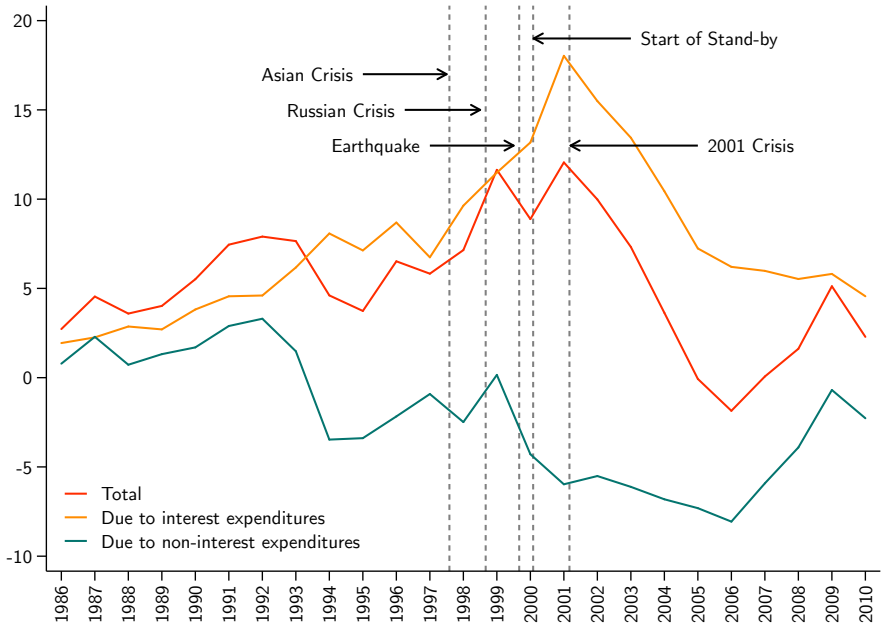
Turkey liberalized the foreign trade and launched an export-led growth program in 1980. Initially, this policy has lead to a substantial increase in the growth performance. However, starting from the second half of 1980s, the fiscal performance deteriorated. This brought about the capital account liberalization in 1989, which allowed the government to finance its borrowing requirement using the capital inflows intermediated by the banking sector, thanks to the managed floating exchange rate regime as well as the explicit guarantees to the banks' deposit liabilities. However, this implied a rapid surge in short-term foreign debt, which brought about the massive economic crises in 1994. Concerns about the government debt dynamics were high and hence a sharp devaluation and an increase in inflation were the situation in the aftermath of 1994 crisis. This "financial repression" helped partly inflating away the government debt. The 1994 crisis also resulted in the take-over of 3 private banks by the Savings Deposit Insurance Fund (SDIF). As a result of these takeovers, government extended the existing guarantee on the deposits banks in a way to cover the entire deposit liabilities.

The public sector borrowing requirement continued to be an important issue for the Turkish economy in the post-1994 period. A series of events in 1990s, such as Asian Crises and Russian Crises, led to an increase in public sector borrowing requirement in Turkey. Figure 1(a) plots the public sector borrowing requirement which is akin to consolidated budget deficit. In the light of growing interest liabilities, primary budget records a surplus as an attempt to keep fiscal situation sustainable. As shown in Figure 1(b), domestic debt was the culprit for high debt/GDP ratio during this period, while external debt was more manageable.

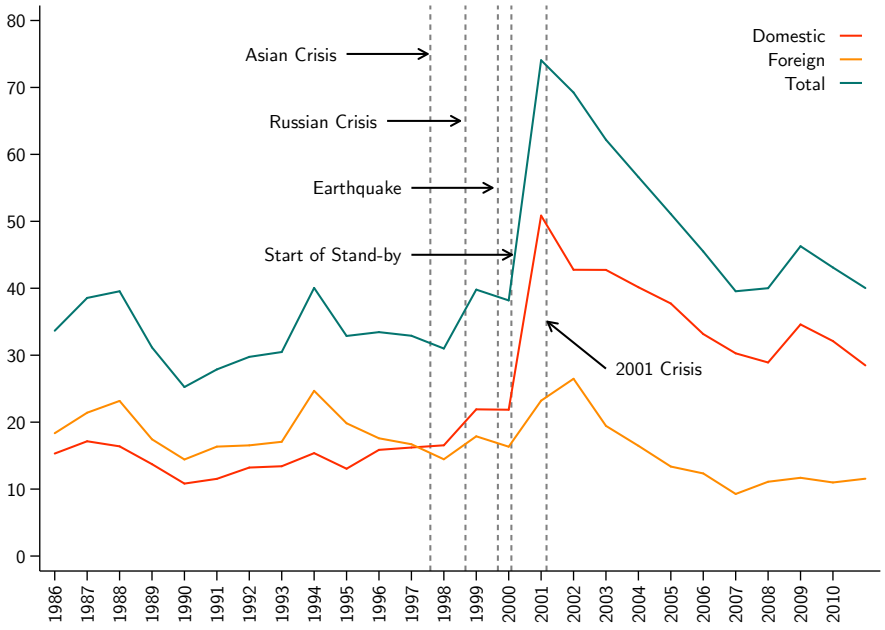
While Asian Crisis in 1997Q3 constituted the first shock to Turkish banks that borrow internationally, the major shock was observed in 1998Q3 when Russia devalued its currency and defaulted on its debt. During this period, the banking sector's portfolios gradually shifted towards the domestic government debt. The changes in the government's financing needs and the increase in the return on holding government debt made the domestic government debt instruments attractive for the banking sector. As a result, Turkish banking sector's government bond and bill holdings as a ratio of total credit extended to non-financial sector doubled within two years, as shown in Figure 2 that plots this ratio for the average bank.

Figure 3 plots the share of government securities in bank's total assets for the average bank and for the aggregate, where the aggregate behavior is driven by the large banks. It is clear that there is no significant difference between large banks and small banks until the 2001 crisis, where in the eve of this crisis, both increased their exposure—large banks much more so—to government debt, consistent with moral hazard stories as in Acharya and Steffen (2014). As shown in Figures 4(a) and 4(b), there seems to be more of an increase in holdings of government debt for the very large (listed pr private), which increased their exposure right up until the 2001 crisis.

The tipping point for the sustainability of the Turkish government's debt has occurred in August 1999, when the Turkey was hit by one of the largest earthquakes in world history in terms of the number of causalities and as well as the economic cost. This was followed by



(a) Public Sector Borrowing Requirement/GDP (%)



(b) Debt/GDP (%)

Figure 1: Evolution of Public Sector Debt in Turkey

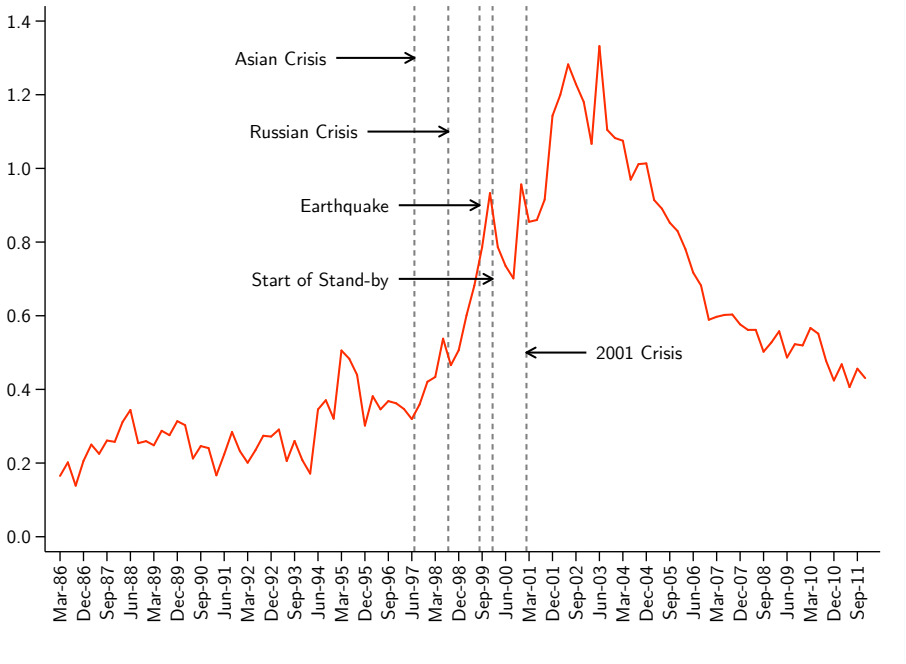


Figure 2: Government Bond Holdings/Credit to Non-Financial Sector

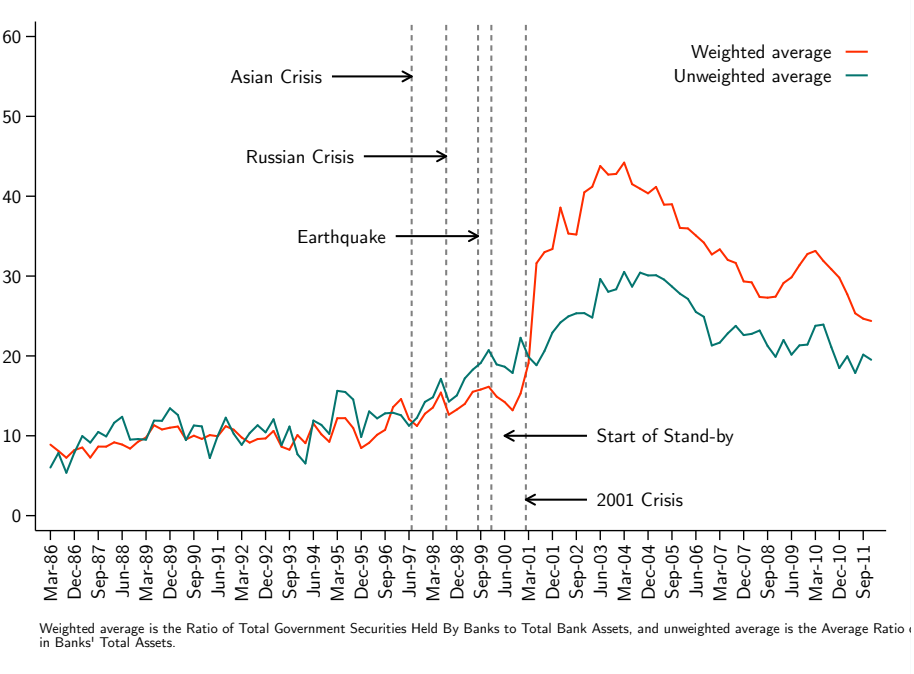
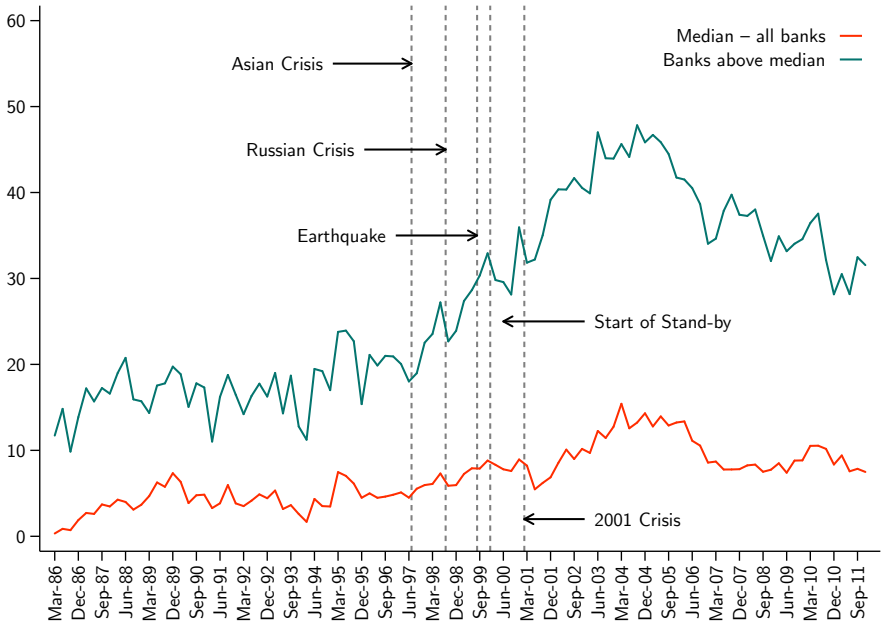
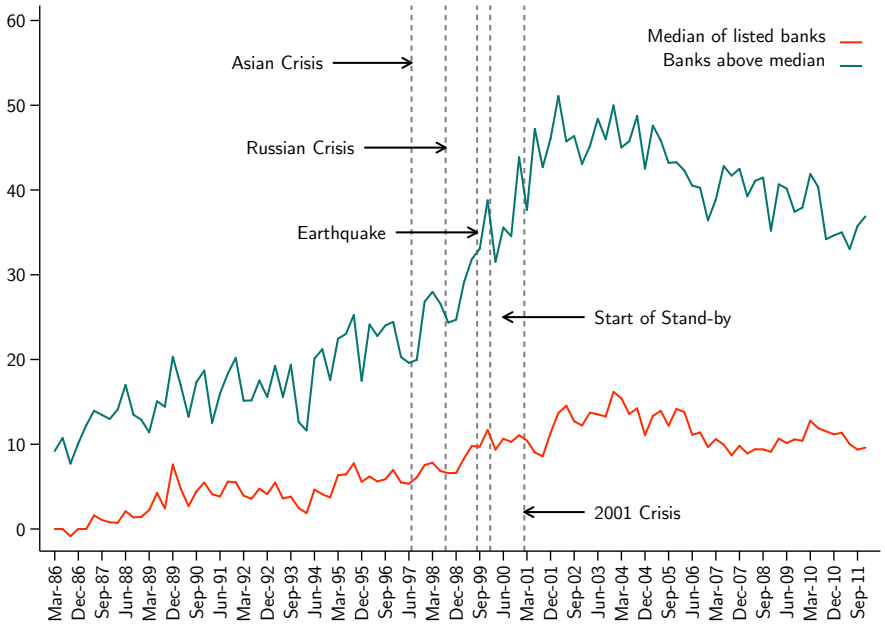


Figure 3: Government Bond Holdings/Total Assets: Aggregate vs Average



(a) All Banks



(b) Listed Banks

Figure 4: Government Bond Holdings/Total Assets: Listed and Non-Listed Banks

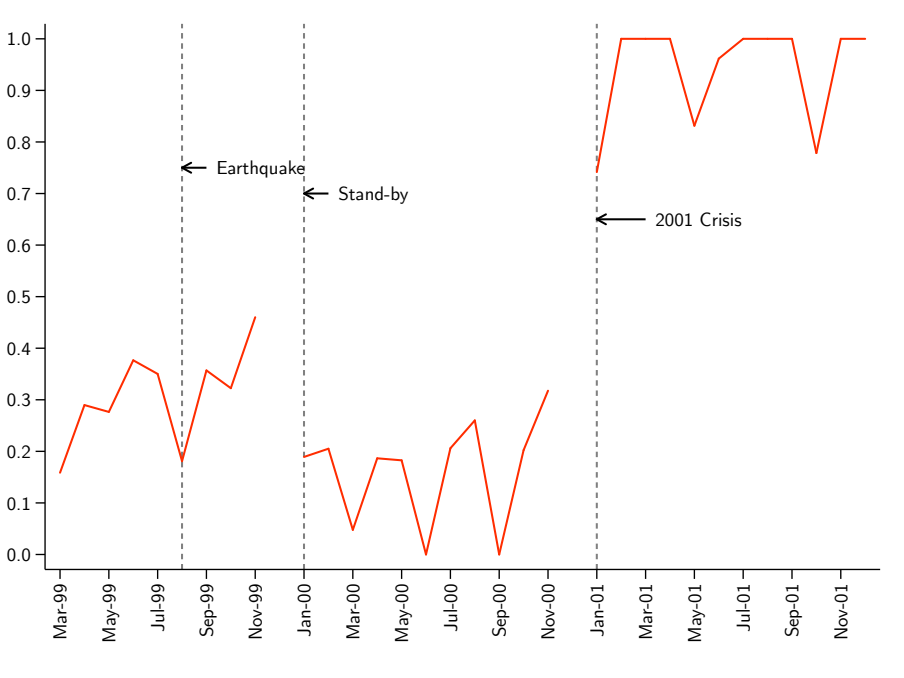


Figure 5: Ratio of Short Term Borrowing in Total Government Borrowing

the second earthquake in November 1999, which made an economic program dictated by the IMF and directed towards maintaining the debt sustainability inevitable. As shown in Table I, the borrowing cost for government and default risk has increased sharply as a result of the earthquake. Table shows approximately a 10 percentage point increase in 3 month coupon yields of floating T-bills after the earthquake, Table also shows the EMBI+ spread increased 100 basis points over a 3 month period during earthquake. The rise of 100 basis points is not small: Italian spreads have increased 200 basis point between July and September 2011, which is the most elevated point of sovereign risk. Figure 6 plots percentage point spread of 3-month Turkish Treasury Bill over the US Treasury Bill, again showing almost half of the rise in spread during the 2001 crisis was observed during the earthquake. Figure 5 shows an increase from 20 to 50 percent in the share of short term borrowing in total borrowing of government after the earthquake. Notice that this share gets close to 100 in the wake of the 2001 crisis, as typical in EM crisis.

The 1999 Marmara earthquake played a crucial role for the perceptions on the sustain-

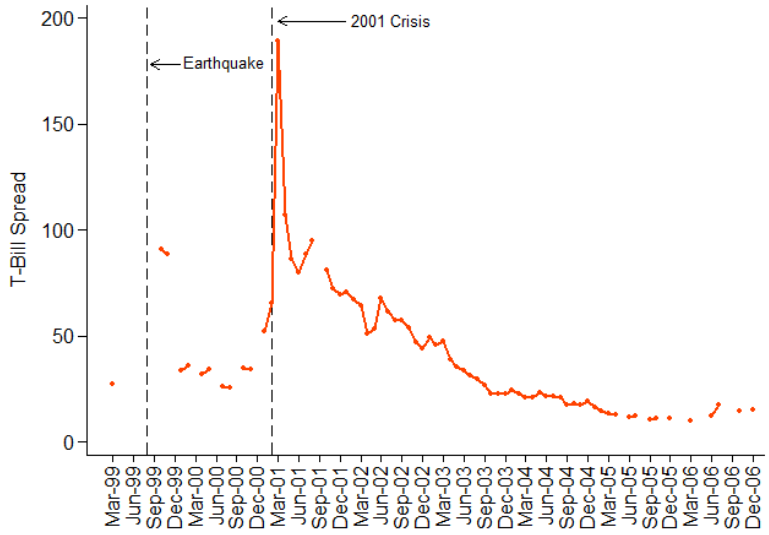


Figure 6: Spread of 3-month Turkish bill over US-T bill

ability of the public debt. The earthquake brought about a total cost estimated to be around 20 billion USD, i.e. roughly 11 percent of the GDP at year 2000 current prices unanticipatedly. These costs consist of infrastructure expenditures, tax revenue losses, production losses and the contingent liabilities resulting for the government.[6] High government debt exposure of the banking sector was accompanied with almost non-existent corporate bond market and equity market exposure implied limited diversification.

A particular question regarding to the earthquake, which is important for our identification strategy, was whether it led to significant changes in the non-performing loans in the region. According to CBRT, the estimated credit risk to the total banking sector in the earthquake region for 1999 was 1.5 billion USD, of which about 60% were private bank credits and 40% were public bank credits. Despite the perceptions of increased default probabilities and the credit rescheduling needs in the region, the total amount of rescheduling as of August 2000 was only 26 million USD in the earthquake region, i.e. only the 1.6 percent of initial estimate of the perceived risk for the earthquake region. In other words, there was no evidence of wide spread defaults in the region and neither a region wide or country wide recession as shown in Figure 7.[7]

On December 9, 1999, the Government and the CBRT announced the program aiming at reducing inflation and restoring the fiscal balance, which involved a 36-month Stand-By agreement with the IMF.[8] On the monetary policy side, this program entailed a pre-announced exchange rate path for Turkish lira against the currency basket composed of US dollars and Euro in equal shares, determined in line with the year end inflation targets. Following a 18-month crawling peg period, the Program envisioned a gradual exit to floating exchange rate regime via widening crawling band regime planned to be implemented in July 2001–December 2002 period. Another aspect of the monetary policy implemented in the context of the Stand-By program was a tight band around the daily values of the

[6]See Akgiray and Erdik (2004) for the estimated economic cost of the earthquake.

[7]See Akgiray and Erdik (2004).

[8]See Özatay and Sak (2002) for an account of the 2000 Stand-By program and 2000–2001 Financial Crises in Turkey.

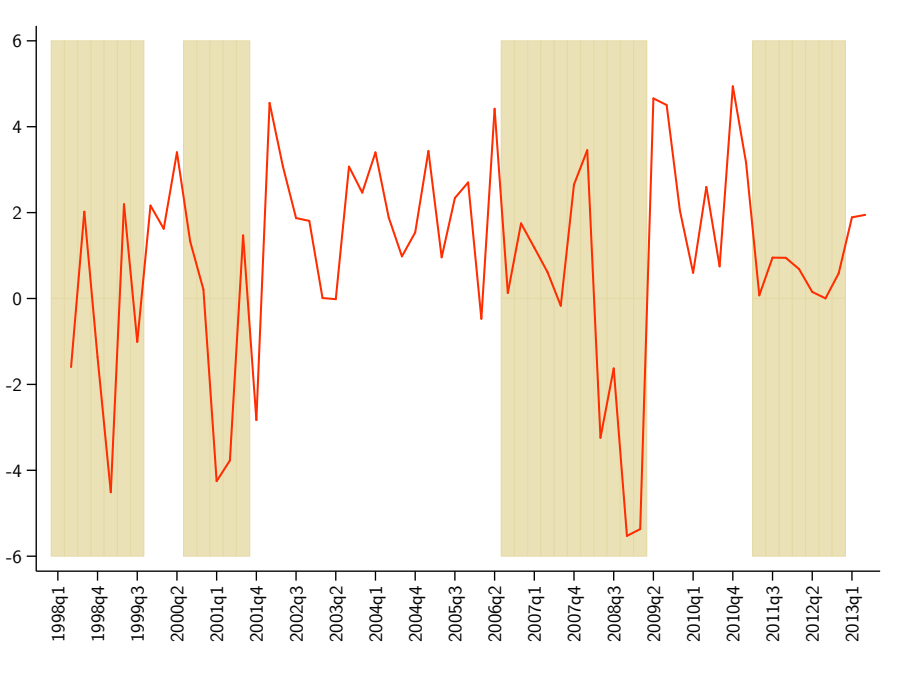


Figure 7: Quarterly GDP Growth

net domestic assets of the central bank. This would imply that there would be limited policy space for using open market operations for liquidity provision to the money market or for sterilization of capital flows. As a result, the changes in net foreign assets of CBRT became the main source of the changes in the monetary base. The program also involved explicit austerity measures on government expenditures, an extensive privatization plan and the explicit government primary surplus targets as performance criteria of the Stand-By Program

Relative to the pre-program period, the Stand-By Program brought about a rapid decline in inflation and interest rates, and a significant improvement in the primary fiscal surplus, leading to a lower ratio of debt to GDP and public sector borrowing requirement. On the other hand, the weaknesses in the banking system and the political uncertainties undermining the credibility of the structural reform agenda brought about concerns on the sustainability of the program in 2000Q4. In November 2000, one of the major banks was taken over by the SDIF, further raising concerns about the Stand-By Program, which led to the start of

capital outflows. However, the official collapse of the Stand-By Program, triggered by a political crises, took place in February 2001, resulting in the free-float of Turkish lira after a sharp devaluation as well as a rapid surge in the inflation rates, nominal interest rates on government debt and one of the largest contraction episodes in the economic activity in Turkey. This also resulted in a substantial financial crises associated with a collapse of a number of private banks.

In May 2001, Turkey announced a new Stand-By Program, aiming at maintaining the discipline in fiscal and monetary policy and restructuring the banking sector. The implementation of the comprehensive reform agenda in the period afterwards resulted in a substantial improvement in the economic fundamentals in the post-2001 period.

IV Conceptual Framework

We will adopt a multi-period version of the two-period model of bank lending by Khwaja and Mian (2008). In period t, bank i's lending is L_{it}. The bank funds itself via deposits, D_{it} and also via other instruments such as bonds, B_{it}, with a marginal cost of α_B. Deposits until an amount $\bar{D_{it}}$ are costless. Bank has a marginal return on loan given by $r - \alpha_L L_{it}$. This captures increasing monitoring costs with each loan. r is the fixed interest rate. Hence the bank's balance sheet is given by $D_{it} + B_{it} = L_{it}$.

In the next period, bank faces a deposit supply shock and a credit demand shock. Hence deposits in the next period are:

$$\overline{D}_{it+1} = \overline{D}_{it} + \bar{\delta} + \delta_i$$

where $\bar{\delta}$ represents a common shock to all banks and δ_i represents a bank-specific supply shock. The credit demand shock will affect the marginal return on loan as:

$$\text{marginal return on loans in } t+1 = r - \alpha_L L_{it} + \bar{\eta} + \eta_{ij}$$

where $\bar{\eta}$ represents a common shock to all demand and η_{ij} represents a bank-specific demand shock from its customer j.

The equilibrium is characterised by the following equations:

$$\alpha_B B_{it} = r - \alpha_L L_{it} \tag{1}$$

$$\alpha_B B_{it+1} = r - \alpha_L L_{it+1} + \bar{\eta} + \eta_j \tag{2}$$

$$\bar{D}_{it} + B_{it} \equiv L_{it} \tag{3}$$

$$\bar{D}_{it+1} + B_{it+1} \equiv L_{it+1} \tag{4}$$

$$\overline{D}_{it+1} = \overline{D}_{it} + \bar{\delta} + \delta_i \tag{5}$$

For the two period, subtracting the FOCs 1 and 2 we obtain:

$$-\alpha_B \Delta B_i = \alpha_L \Delta L_i - \bar{\eta} - \eta_{ij}$$

And we replace with the identities 3 and 4:

$$-\alpha_B \left(\Delta L_i - \Delta D_i\right) = \alpha_L \Delta L_i - \bar{\eta} - \eta_{ij}$$

Using 5 and rearraging terms, we obtain:

$$\Delta L_i = \frac{\alpha_B}{\alpha_B + \alpha_L} \left(\bar{\delta} + \delta_i\right) + \frac{1}{\alpha_B + \alpha_L} \left(\bar{\eta} + \eta_{ij}\right)$$

Which can be re-grouped into economy-wide shocks and idiosyncratic shocks:

$$\Delta L_i = \frac{1}{\alpha_B + \alpha_L} \left(\alpha_B \bar{\delta} + \bar{\eta}\right) + \frac{1}{\alpha_B + \alpha_L} \left(\alpha_B \delta_i + \eta_{ij}\right)$$

Or alternatively:

$$\Delta L_i = \frac{1}{\alpha_L + \alpha_B}\bar{\eta} + \frac{\alpha_B}{\alpha_L + \alpha_B}\Delta D_i + \frac{1}{\alpha_L + \alpha_B}\eta_{ij}$$

In a multi period version we can write the above equation as:

$$L_{it} = \frac{1}{\alpha_L + \alpha_B}\bar{\eta} + \frac{\alpha_B}{\alpha_L + \alpha_B}D_{it} + \frac{1}{\alpha_L + \alpha_B}\eta_{ijt} + \frac{1}{\alpha_L + \alpha_B}\alpha_i$$

The first term represents common shocks for all banks, such as the aggregate macroeconomic shocks, and hence can be captured in the empirical analysis by a time fixed effect. The second term is idiosyncratic to the bank and time varying in a multi-period setting. The interpretation of this term is a bank specific change to net worth or deposits. Third term is bank specific demand effect from customer j, which can also vary across time and finally last term is a bank fixed effect, meaning the loans will change over time only due to bank time varying factors.

V Identification and Measurement

Based on the above framework, we estimate the equation below:

$$L_{it} = \alpha_i + \lambda_t + \omega_{iq} + \beta_1 Gov\ Debt\ Exp_{it-1} + \beta_2 Earthquake_t \times GovDebtExp_{it-1} + \beta_3 X_{it-1} + \epsilon_{it} \tag{6}$$

where i is bank, t is month and α_i and λ_t stand for bank-fixed effects and month-fixed effects, which control for the time-invariant unobserved heterogeneity across banks and all common shocks to the banks (including direct effect of the earthquake), respectively. ω_{iq} controls for loan demand (η_{jt} in the above framework), where q stands for quarter.

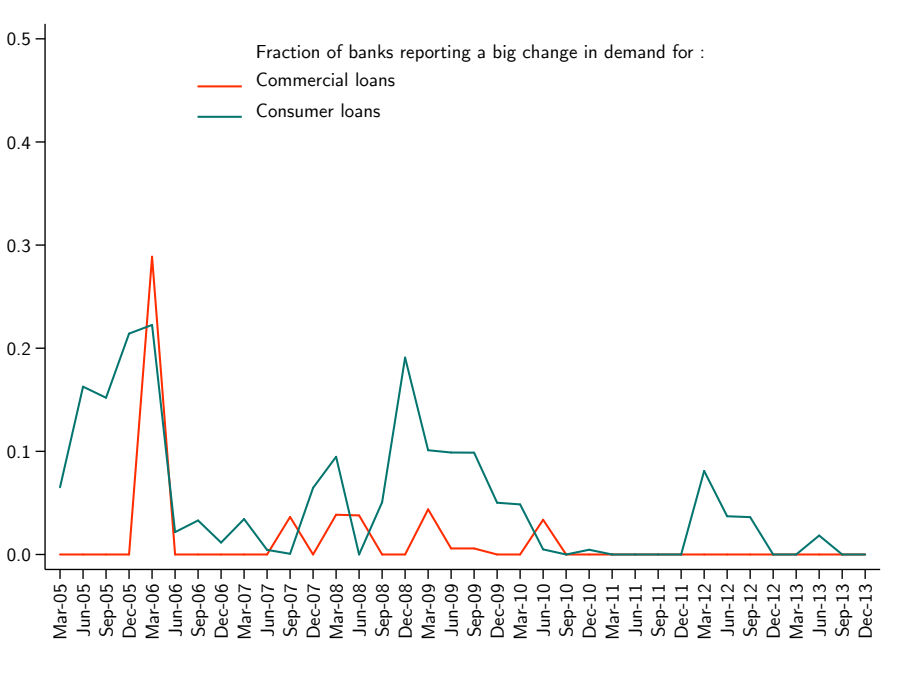


Figure 8: Fraction of Banks Reporting a 25 Percent Change in Credit Demand

Our reasoning for this control is based on the loan officer survey data provided by CBRT. Each bank undertakes such a survey since 2005 that suggests that firms' demand for loans move very slowly as shown in Figure 8. We assume that this was also the case during the earthquake period. Our assumption is supported by the fact that the firm-bank relationships in general have a very sticky nature even in developed countries like US who has developed financial markets.[9] Hence, given the monthly nature of our bank level data, the bank-quarter fixed effects will absorb slow moving firm-bank specific demand.

The outcome of interest, L_{it}, is banks' lending. We measure the loan supply with credit provision normalized by assets, that is, share of credit to non-financial firms in total assets. We measure the government debt exposure, $Gov\ Debt\ Exp_{it-1}$, by ratio of banks' government security holdings to total banks' assets. As explained above, β_2 gives us how the outcomes of banks with low and high exposure to government debt differ before and after the exogenous shock. In order to assure that we do not capture the effects of other events that might have

[9]For example, see Chodorow-Reich (2014).

affected the sustainability of the government debt differentially, we also control interactions of government debt with the other major events that happened before and after the 1999 Marmara Earthquake, such as Asia Crises, Russia Crisis, Stand-by agreement, and 2001 crises. The direct effects of these events are absorbed by the month fixed effects.[10] We use *Gov Debt* Exp_{it-1}, lagged 1 month, 2 month and 3 months to check robustness of our results since we will define the Earthquake period with a dummy equals to 1 for August-November 1999. X variable will include other bank time varying factors.

VI Data and Descriptive Statistics

We use confidential monthly bank balance sheet data from Turkey for 1997–2012 period. This data is collected regularly as part of the *Monitoring Package*, which is the data collection and processing system for monitoring and regulation purposes. All the banks operating within Turkey are obliged with reporting their balance sheets as well as extra items by the end of month to the regulatory and supervisory authorities, such as the CBRT and the Banking Regulation and Supervision Agency (BRSA). We also use the extra reporting of the banks, such as the decomposition of the banks' securities portfolio including the information on which particular securities are held by banks by the end of each month, net positions against domestic and foreign creditors and the currency denomination of assets and liabilities through interbank operations.

The banks in our sample are all banks operating within Turkey, regardless of the ownership status or the classification with respect to the main activity -such as deposits banks or investment banks.

In terms of bank entry and exit, the Turkish banking industry has experienced important variations over time as shown in Figure 9. While there were 49 banks (6 of which being state-

[10]We define the crises and other dummies as follows. The Asian crisis is a binary variable equal to 1 between July 1997–December 1997. The Russian crisis is a binary variable equal to 1 between August 1998–January 1999. The earthquake is a binary variable equal to 1 between August 1999–November 1999. The Turkish crisis is a binary variable equal to 1 between February 2001–December 2001.

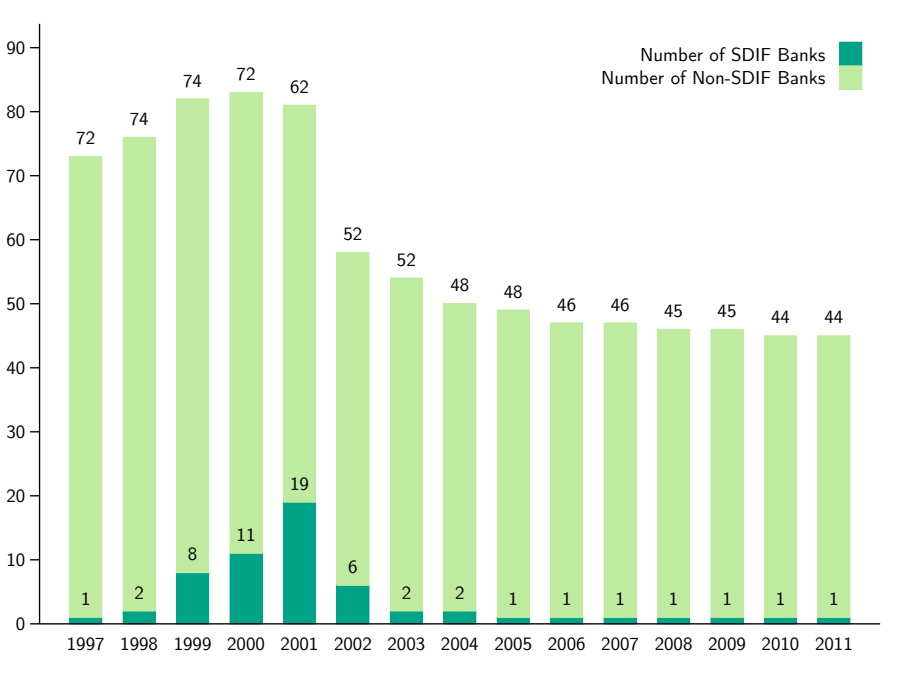


Figure 9: Bank Entry and Exit

owned deposit/savings banks) in 1986, the number of banks reached 82 (4 of which being state-owned deposit/savings banks) by the end of 1999. However, in 1999–2003 period, the number of banks has declined substantially due to the series of events including the financial crises in 2000–2001 period. In particular, if the regulatory agency observes a private bank to experience a decline in its capital adequacy ratio resulting from losses due its operations, then the bank is asked to add new capital and to improve the balance sheet quality. However, if the bank fails to take necessary actions and bank's capital adequacy ratio falls below the legal limit, then its control is taken over by SDIF to provide immunity to the depositors as well as to limit the risks to the banking system. In the aftermath of the 2001 crises, the weak capital structure of the Turkish banks resulted in a number of takeovers. As a result, in 2000–2004 period, a total of 25 banks were taken over by SDIF. Also, a number of mergers and acquisitions resulted in a decline in the number of private banks in Turkey in the post-crises period, resulting in a total of 45 banks operating in Turkey as of end of 2011.

Table II presents the key descriptive statistics of our banks. We observe a significant cross-

sectional heterogeneity with respect to holdings of government securities in banks' balance sheets, where mean is around 18-20 percent depending on the period and it can be as high as 46 percent.[11] Table III presents key macro indicators and as can be seen public debt was not very high on average. Table IV present the average ratios for government securities to assets and loans to assets before and after the earthquake. It is clear that average exposure to public debt stays around the same but average credit provision declined.

VII Empirical Analysis

Figure 10 presents aggregate data, plotting credits to non-financial sector as a ratio to total assets of the financial sector, where this ratio falls to 22 percent from approximately 36 percent during the events starting with Asian crisis. This figure mimics our previous Figure 2 where we show typical bank also decreases credit to non-financial sector during this period, increasing loans to government sector by similar amounts. Our analysis below recovers that during this period where credit to private sector declined as a resulting of a crowding out effect coming from government borrowing, there is an additional effect of an unanticipated fiscal shock. The banks who were exposed more to government debt and hence affected more from this shock, decreased their lending to private sector even more. Wwe interpret this finding as the evidence for the balance sheet channel.

A The Banks' Balance Sheet Health and Credit Provision

We identify how banks' performance and credit provision are affected from government debt exposure by comparing banks with different degrees of exposure before and after the sizable and unanticipated fiscal shock experienced in Turkish economy.

Table V runs a simple cross sectional regression by collapsing the sample in two periods

[11] For a world-wide sample of banks, the average for government debt holdings to assets is 12 percent and for German banks it is 15 percent. See Gennaioli, Martin, and Rossi (2014a) and Buch, Koetter, and Ohls (2013), respectively.

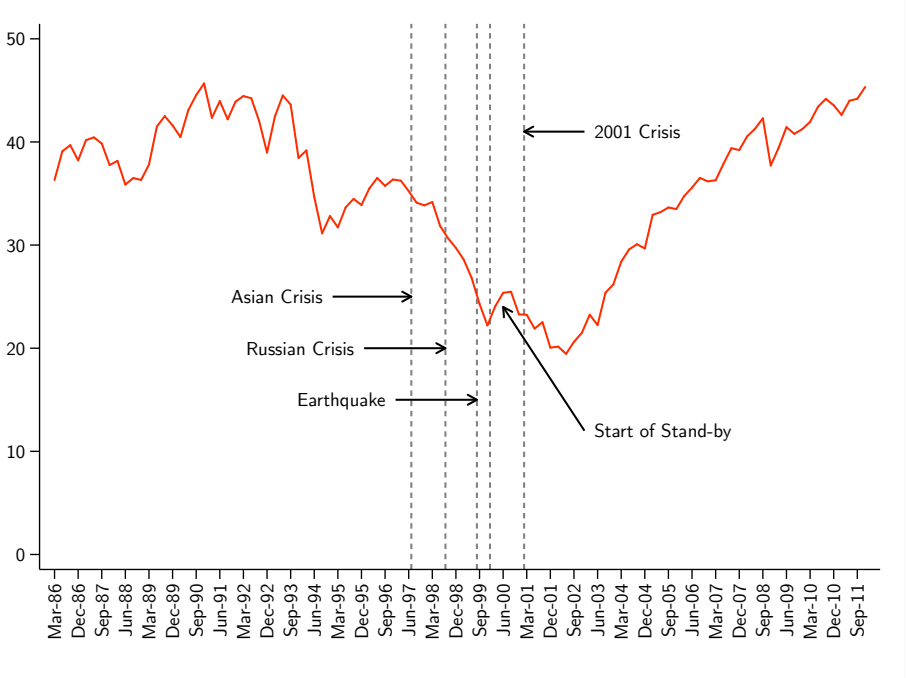


Figure 10: Lending to Private Sector as a Ratio of Financial Sector Assets

as pre-post earthquake to highlight the intuition of the exercise. There is a clear reduction in loan supply after the earthquake by the banks who have higher exposure to government bond market before the earthquake. This effect is robust to excluding state owned banks and foreign owned banks as shown in columns (2) and (3) and also robust to excluding both as shown in column (4). Given the cross sectional nature of this exercise, one cannot tell whether the effect is driven by unobserved fixed bank characteristics, the inherent crowding out nature of lending to government, or the balance sheet effect, that is lower value of government bonds reducing banks' net worth. In fact the estimated coefficient is very high since this estimate probably includes all these effects: A coefficient of -0.6 suggests that a bank who holds 20 percent of its portfolio in government assets (the mean), reduces credit supply 40 percent over the mean loan to asset ratio after the earthquake, which is an implausible effect.

To separate out the stories, we first try to understand the time invarying and time variant determinants of government bond holdings. As show in Table VI most determinants of government bond holdings are time invarying such as being a state bank. In column (3) upon

controlling for bank and month fixed effects and double clustering standard errors both at bank and month level to allow for serial correlation, we find that banks who increase their capital ratio over time hold less government bonds in their portfolio over time. Same is true for interbank balances since banks who accumulate higher surpluses on their interbank balances need less government bond holdings as collateral. Surprisingly banks who accumulate more non performing loans over time also tend to accumulate less government bond holdings over time.

Of course what is important for our identification is whether these determinants of government bond holdings at bank-time level vary systematically at the time of earthquake. Table VII investigates this possibility. As shown in column (4), once we account for all the fixed effects, banks with higher cash holdings than average are the only ones who increase their government holdings at the time of earthquake. This can be associated with risk taking behavior but also with supplying government with the needed funds since these are the stronger banks. Nevertheless we will control for cash holdings below when we investigate the effect of government bond holdings on private sector credit provision.

We show our benchmark result in Table VIII, where now we run the panel difference-in-difference specification. While exploring the effect of pre-earthquake government debt exposure at the time of the fiscal shock on the banks' lending behavior, the panel specification allows us to control for unobserved time invariant bank heterogeneity. We always use holdings pre-event. We introduce other events and their interactions with government bond holdings in addition to earthquake, such as Asian crises, Russian Crises, and the 2001 crises as controls for exploring the differential loan supply effect of fiscal shock induced by the earthquake with respect to banks' government debt exposure. Regardless of whether we control for these events or not, we observe that the banks with higher exposure to the treasury bills faced higher declines in loan supply.

The effect of bond holdings during other events is very intuitive. There is no significant impact of bond holdings during Asia crisis, where bond holdings are pre-Asia crisis, as expected since this is an external shock and not a domestic shock that increased sovereign

risk. We obtain the same result with Russian crisis. There is a similar negative effect of holding government bonds during the 2001 crisis, where the estimated coefficient is bigger than that of the earthquake as expected. The difference between these two events of course is that the latter is endogenous, although both are fiscal shocks and both cause a decline in value of government bonds with the heightened sovereign risk. The last three columns control for bank specific demand with bank-quarter effects. The effect of holdings is larger during 2001 crisis if we do not control for these as expected since there is an economy wide recession during the 2001 crisis.

The first five columns defines the earthquake period as August-November 1999, whereas column (6) defines it as August-October 1999. The main reason for this alternative definition of the earthquake is that the government unexpectedly imposed a tax on banks' income on government securities holdings on November 26, 1999 to cover the fiscal burden due to the earthquake. This naturally raises the question of whether our results hold even when we disregard this direct implication of the earthquake on banks' balance sheets. The answer is no in the sense that banks balance sheets were not hurt because of a direct tax since these columns leave that out.

The economic significance of these effects are sizeable. Our estimates imply that, a bank that holds 75 percent of its assets in government bonds decreases credit provision 2 percent during regular times and 6 percent during earthquake, relative to mean. We measure credit provision by loans to assets so these are big affects (mean loans to asset ratio is 30 percent). The actual decline in loan provision is 3 percentage points. A bank with mean bond holdings (20 percent of its assets) will decrease loan supply by 1.7 percentage points during the earthquake and hence our estimates can explant 58 percent of the actual decline in credit provision from July to October 1999. For the bank with mean holdings, since the estimated decline in the ratio of credit to bank's total assets is 1.7 percentage points and since there is a 100 basis points increase in spreads during the earthquake period, this is very sizeable.[12]

[12]Credit supply declined 1.3 percentage points for 200 basis points increase in Italian spreads, see Bofondi

In Table IX, we control for potential determinants of government bond holdings that may be correlated with loan provision at regular times and at crisis times. Although we know from the previous tables that the only determinant that has an impact on government bond holdings during earthquake is cash holdings, we still control each determinant one by one in respective columns. In this table we also use banks that are not taken over by SDIF. This exercise is important especially if there are concerns about the unobserved confounding features of the banks taken over by the SDIF, which would affect these banks' performance even in the absence of a fiscal shock. Although most of these factors will be taken care for by a bank fixed effects and bank-quarter effects, we still run our regressions in a sample of surviving banks throughout the sample period in order not to bias our result if the banks were being taken over at the time of earthquake by chance were weak banks all along.[13] In this table we show that this is not the case. In fact upon using survivors and controlling for bank-time level determinants, we still find the same size coefficient as in our benchmark table.

B Threats to Identification

B.1 Placebo Tests

Table X runs placebo tests, where we define a "Placebo Earthquake" as a binary variable equal to 1 between April 1999 and July 1999. Despite the existence of a negative relation between high government debt exposure and lending in normal times, there is no additional effect at the time of our pseudo earthquake. This suggests that the effects we find with the earthquake are a result of increased default risk on the part of government which deteriorated the balance sheet health of banks with high exposure and hence negatively affected their lending.

and Sette (2013).

[13]Only 8 banks are taken over in 1999, so this is not likely to affect our results. Note that if the claim on bad banks will fail anyway is true and we fail to control for it then a diff-in-diff strategy should not give us any result since this strategy identifies off of the relative difference between bad and good banks at the time of the earthquake.

The second column of this table uses the shorter sample until the end of 2002 showing that our results stay intact, though here we obtain a larger coefficient given the less time series observations.

Table XI undertakes an alternative analysis to get at the demand effect. We matched the foreign banks operating in Turkey to their balance sheets in bankscope and subtract their lending in Turkey (which is almost none) from their lending in the region (Eastern Europe), obtaining their lending outside Turkey. Since this lending will not be affected at all by the earthquake in Turkey, it is reassuring that we find similar results. The estimates are bigger for the 2001 crisis of course since the size of the balance sheet shock is bigger and it signalled contagion but the effect is also there for the earthquake.

C Price Effect

Table XII looks at the impact of the fiscal shock on banks' balance sheet performance by considering the banks' financial asset valuation changes between current and previous period as a ratio to their total assets in the first two columns and by looking at profits in the last two columns. The idea is to establish evidence that the effect we find goes via balance sheet deterioration. In practice, the banks have to revaluate the value of their portfolio as the prices change since they do not mark their portfolio to market.[14] For the banks which hold the same government security portfolio both at time t and t-1, an increase (a decrease) in the price of the government security induces a revaluation indicating an increase (a decrease) in portfolio's monetary value. We find that the banks with higher share of government securities in their balance sheets had a decline in value of portfolio, given the decline in the value of this asset with the fiscal shock. This shows the direct effect of a decline in the collateral value on bank's balance sheet which affects its credit supply and constitutes a direct hit to profits as shown in last two columns.

[14]Notice that keeping the sovereign bonds in the trading book and marking them to the market practice came to Turkish banks after December 2002 regulation for the banks' accounting standards.

C.1 Prior Trends in Outcomes

A key threat to identification is existence of differential prior trends in our dependent variable. In particular, in order to attribute the corresponding changes in lending to the role of the differences in government debt exposure at the time of the exogenous fiscal shock, one of the issues that we need to check is the parallel movement of the outcome variables for the banks with high and low government debt exposure. The placebo exercise we showed earlier confirms that this is not the case but we still show here the actual trends in the data.

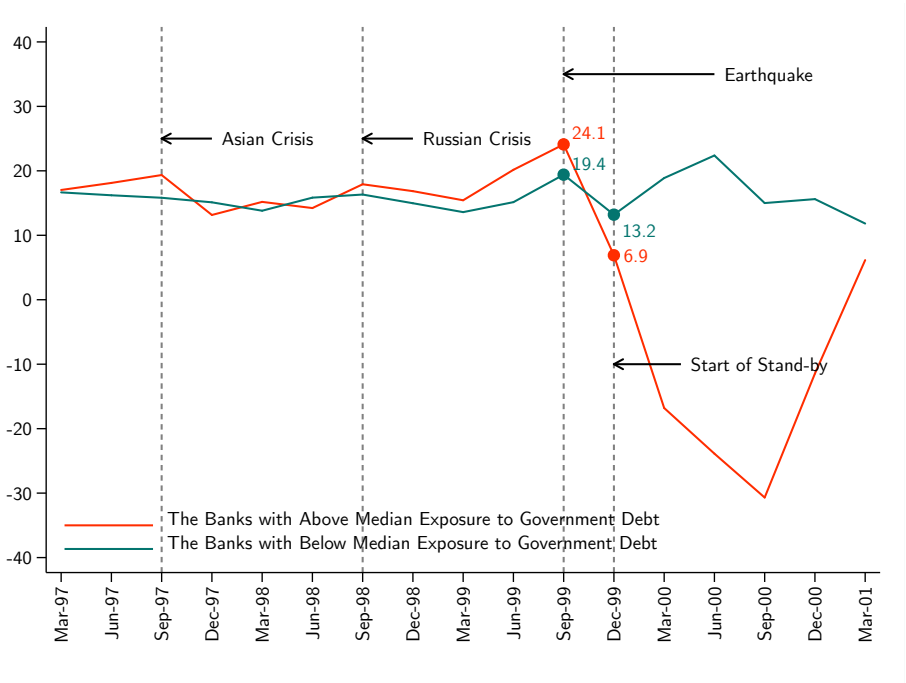


Figure 11: Net Worth of Banks with High-Low Exposure to Government Bond Market

In Figure 11, 12 and 13, we present respectively the time series behavior of the net worth, profits and the loan provision of banks with above and below median exposure to the government debt. These clearly indicate that there were no differential prior trends in our key outcome variable and also balance sheet strength across high and low government debt exposure banks. In other words, the estimated negative and significant coefficient on the interaction between the government debt exposure and the earthquake variable does

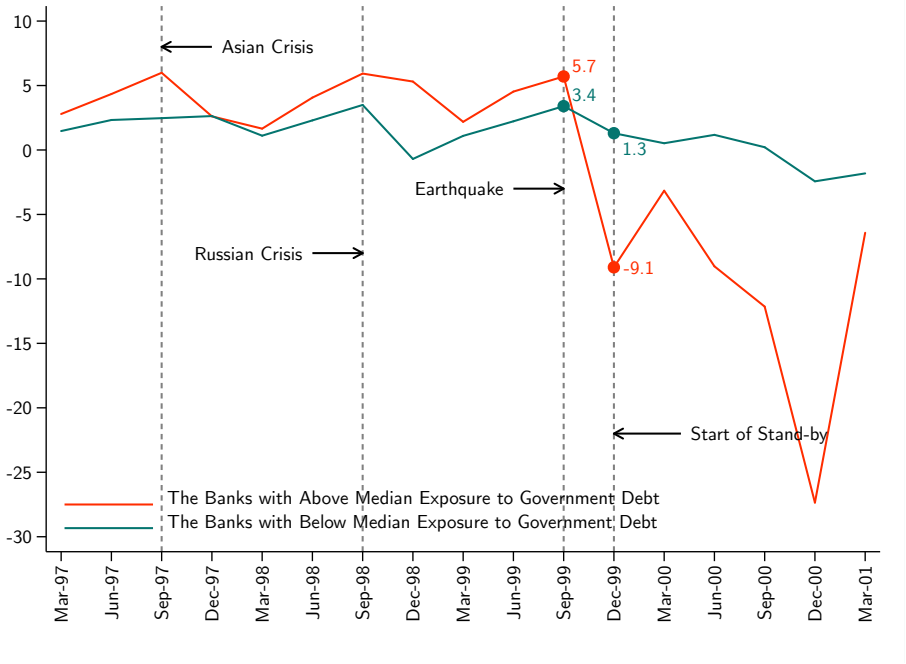


Figure 12: Profits of Banks with High-Low Exposure to Government Bond Market

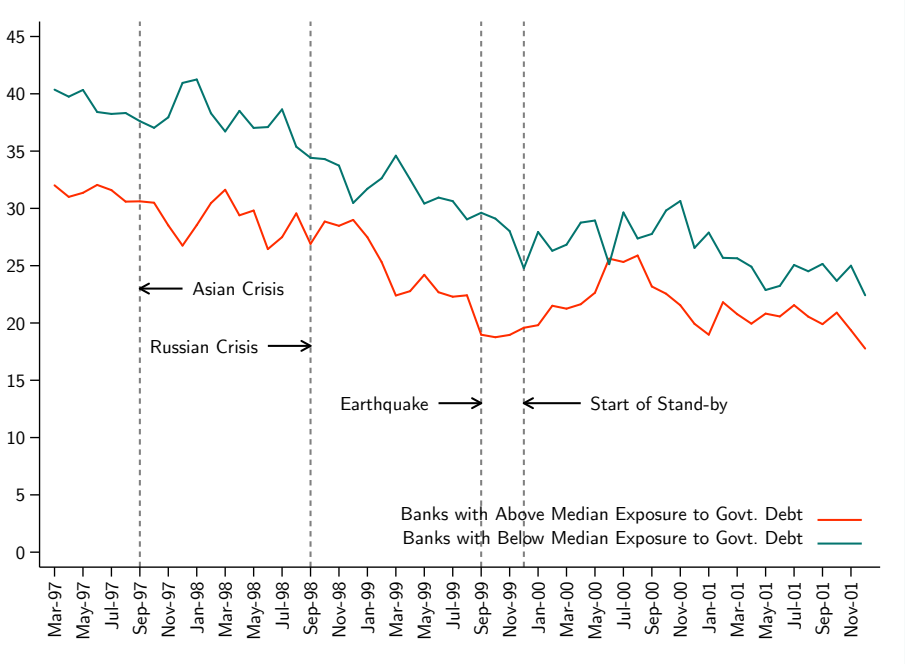


Figure 13: Loan Provision of Banks with High-Low Exposure to Government Bond Market

not reflect the already existing deterioration in profits, net worth and loan provision of the banks with higher exposure, but rather the impact of the earthquake on the banks' balance performance and the loan provision.

VIII Conclusion

We identify the effect of government debt on banks' balance sheet health and credit provision. We use data from the universe of banks in Turkey during 1997–2011. For identification, we use a rare disaster, the 1999 Marmara Earthquake—one of the largest earthquakes in world history, as a major unanticipated fiscal shock. Using a differences-in-differences methodology, we investigate whether the differences in the degree of banks' exposure to the government debt matter for the effect of fiscal shock on differences in outcomes.

Our results indicate that high government debt exposure resulted in a differential decline in the credit provision. We show that the negative differential effect of fiscal shock on the credit provision of the banks with higher government debt exposure works via the balance sheet channel and not via other channels such as a lender-of-last-resort effect, demand effect or a risk taking channel.

Our results provide evidence on the link between fiscal distress and financial imbalances, where the causality goes from fiscal to financial stress impacting the real sector. Using an exogenous rare event which triggered a fiscal shock and an increase in sovereign risk, we identify that the fiscal imbalances has important causal implications for the performance of the financial sector and credit provision. Although our identification is clear, valid and policy relevant, it works only for the link from the government to banks. Hence, the caveat is that we cannot say anything for the predictive power of banking crisis on sovereign defaults, which is equally important.

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Table I: Sovereign risk

	(1)	(2)	(3)
	Compounded Interest Rates on Government T-Bill Auctions (Percent)		Turkish Bond-Spreads
	For Bills with Approxi-mately 550 Days to Maturity	For Bills with Approxi-mately 1,050 Days to Maturity	EMBI+
July 1999	117.71	119.91	564
August 1999	123.80	127.62	665

Notes: (1) Source: CBRT for Columns 1 and 2. (2) The numbers in Columns 1 and 2 show the annual compunded interest rates on auctions for 3-month coupons for floating rate government bonds of approximately 550 and 1050 days to maturity. (3) Numbers in Column 3 are the end-of month basis-point value of EMBI+ spread for Turkey.

Table II: Descriptive Statistics

	January 1997 - December 2011						
	count	mean	sd	p25	p50	p75	p90
Gov Bond Holdings	10203	0.2145	0.1776	0.0829	0.1698	0.2974	0.4602
Capital Ratio	10199	0.2238	0.2559	0.0943	0.1385	0.2855	0.6311
Loans to Private Sector	10203	0.3161	0.2148	0.1318	0.3106	0.4807	0.6142
Non-Performing Loans	10193	0.0073	0.0131	0.0000	0.0011	0.0076	0.0233
Bank Size	10203	12.4164	2.2023	10.8247	12.4399	13.9221	15.4404
Cash Holdings	10193	0.0065	0.0079	0.0002	0.0046	0.0093	0.0159
Interbank Balances	10193	-0.0892	0.2802	-0.2187	-0.0688	0.0417	0.2155
Valuation	10141	0.1398	0.3823	0.0000	0.0000	0.0377	0.5316
Profits	10199	0.0109	0.0515	0.0016	0.0104	0.0251	0.0564

	January 1997 - December 2002						
	count	mean	sd	p25	p50	p75	p90
Gov Bond Holdings	5153	0.1824	0.1566	0.0690	0.1436	0.2451	0.3975
Capital Ratio	5153	0.1678	0.2511	0.0742	0.1172	0.2306	0.5022
Loans to Private Sector	5153	0.2709	0.1779	0.1270	0.2644	0.3908	0.5063
Non-Performing Loans	5147	0.0091	0.0156	0.0000	0.0012	0.0096	0.0407
Bank Size	5153	12.1259	2.0483	10.6258	12.2497	13.5374	14.8369
Cash Holdings	5147	0.0083	0.0096	0.0005	0.0057	0.0124	0.0198
Interbank Balances	5147	-0.0858	0.2824	-0.2373	-0.0601	0.0588	0.2234
Valuation	5095	0.1068	0.3529	0.0000	0.0000	0.0000	0.1652
Profits	5153	0.0121	0.0636	0.0010	0.0128	0.0348	0.0777

Gov Bond Holdings is defined as the bank's holdings of government bonds in ratio to Total Assets. Capital Ratio is defined as the ratio of Shareholder Equity to Total Assets, winsorized at 1%. Loans to Private Sector is defined as Total Loans to Private Sector in ratio to Total Assets. Non-Performing Loans is defined as (Non-Performing Loans - Provisions on Non-Performing Loans) in ratio to Total Assets, winsorized at 5%. Bank Size is defined as the log value of total assets delfated to 2000 USD using PPI. Cash Holdings is the banks cash holdings in ratio to total assets, winsorized at 1%. Interbank Balances are defined as (Receivables-Payables) from banks (except the Central Bank), in ratio to Total Assets. Valuation is financial assets valuation difference (i.e. loss provision) as a ratio to total assets, winsorized at 5% (multiplied by 100). Profits are the bank profits in ratio to total assets, winsorized at 2%.

Table III: Selected Macroeconomic Statistics (%)

	1997-2002	1997-2011
Average Annual GDP Growth Rate	2.50	4.29
Average Investment to GDP Ratio	20.55	22.19
Credit to Private Sector to GDP	15.30	19.60
Bank Assets to GDP	53.40	59.10
Public Debt to GDP	48.47	47.50

Table IV: Loans to Private Sector and Government-Bond Holdings Before and After EQ

	Government-bond holdings	Loans to Private Sector
April-July 1999 Average	18.7	26.8
August-October 1999 Average	19.0	24.8

Note: Measures are expressed as a ratio to Total Assets (%.

Table V: Average Bond Holdings and Credit Supply

	(1) All	(2) Drop State	(3) Drop Foreign	(4) Drop State and Foreign
Avg Gov Bond Holdings Before EQ	-0.378***	-0.400***	-0.597***	-0.641***
	(0.0167)	(0.0170)	(0.0182)	(0.0185)
Constant	0.306***	0.309***	0.387***	0.399***
	(0.00360)	(0.00375)	(0.00399)	(0.00419)
Observations	9882	9228	7172	6518
R^2	0.047	0.053	0.127	0.150

Dependent variable is the average value of loans to the private sector in ratio to total assets for each bank over the period from August 1999 to November 1999. Independent variable is the average value of Government bond holdings in ratio to total assets for each bank over the period from January 1997 to July 1999. Sample in column (1) is all banks. Sample in column (2) drops banks that were ever owned by the state. Sample in column (3) drops banks that were majority foreign owned at the time they entered the sample. Column (4) drops both state owned and foreign owned banks. Standard errors are robust. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table VI: Determinants of Government Bond Holdings

	(1)	(2)	(3)
Capital Ratio$_{t-1}$	-0.0892***	-0.143***	-0.143***
	(0.0108)	(0.0126)	(0.0509)
Non-Performing Loans$_{t-1}$	-0.964***	-1.175***	-1.175**
	(0.129)	(0.136)	(0.558)
Bank Size$_{t-1}$	0.00491***	-0.0288***	-0.0288*
	(0.000997)	(0.00344)	(0.0168)
Cash Holdings$_{t-1}$	-0.839***	-2.398***	-2.398*
	(0.220)	(0.318)	(1.263)
Interbank Balances$_{t-1}$	-0.127***	-0.127***	-0.127***
	(0.00710)	(0.00934)	(0.0395)
Domestic Bank	-0.0269***		
	(0.00435)		
State Owned Bank	0.121***		
	(0.00754)		
Observations	10107	10107	10107
Bank Fixed Effects	No	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes
Double Cluster	No	No	Yes

Dependent variables is Government Bond holdings in ratio to total assets. Domestic bank is a dummy that takes a value of 1 if the bank was majority domestic owned at the start of the sample. State bank is a dummy that takes a value of one if the bank was ever state owned. All variables are as defined in Table II. Double clustered regressions are clustered at the bank and month levels. Otherwise, standard errors are robust. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table VII: Determinants of Government Bond Holdings During EQ

	(1)	(2)	(3)	(4)
Capital Ratio$_{t-1}$	-0.0971***	-0.148***	-0.148***	-0.0157
	(0.0110)	(0.0126)	(0.0494)	(0.0353)
Non-Performing Loans$_{t-1}$	-0.942***	-1.123***	-1.123**	-0.194
	(0.132)	(0.137)	(0.538)	(0.309)
Bank Size$_{t-1}$	0.00518***	-0.0284***	-0.0284*	0.0178
	(0.00101)	(0.00343)	(0.0162)	(0.0150)
Cash Holdings$_{t-1}$	-1.046***	-2.608***	-2.608**	0.0300
	(0.226)	(0.320)	(1.214)	(0.270)
Interbank Balances$_{t-1}$	-0.125***	-0.127***	-0.127***	-0.0238
	(0.00724)	(0.00929)	(0.0369)	(0.0255)
Domestic Bank	-0.0266***			
	(0.00435)			
State Owned Bank	0.121***			
	(0.00749)			
(Capital Ratio$_{t-1}$)*(Earthquake)	0.201***	0.186***	0.186**	0.0321
	(0.0565)	(0.0577)	(0.0828)	(0.0486)
(Non-Performing Loans$_{t-1}$)*(Earthquake)	-0.0765	-0.732*	-0.732	0.191
	(0.576)	(0.426)	(0.613)	(0.204)
(Bank Size$_{t-1}$)*(Earthquake)	-0.00701	-0.0106**	-0.0106	-0.000984
	(0.00518)	(0.00432)	(0.00717)	(0.00273)
(Cash Holdings$_{t-1}$)*(Earthquake)	4.100***	3.802***	3.802***	2.263***
	(0.953)	(0.925)	(0.918)	(0.730)
(Interbank Balances$_{t-1}$)*(Earthquake)	-0.0695**	-0.0616*	-0.0616	-0.0142
	(0.0354)	(0.0343)	(0.0485)	(0.0402)
Observations	10107	10107	10107	10107
Bank Fixed Effects	No	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes
Bank Quarter Fixed Effects	No	No	No	Yes
Double Cluster	No	No	Yes	Yes

Dependent variables is Government Bond holdings in ratio to total assets. Earthquake is a dummy that takes a value of one from August 1999 to November 1999. Domestic bank is a dummy that takes a value of 1 if the bank was majority domestic owned at the start of the sample. State bank is a dummy that takes a value of one if the bank was ever state owned. All variables are as defined in Table II. Double clustered regressions are clustered at the bank and month levels. Otherwise, standard errors are robust. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table VIII: Government Bonds and Credit Supply

	(1)	(2)	(3)	(4)	(5)	(6)
Gov Bond Holdings$_{t-1}$	-0.336***	-0.336***	-0.336***	-0.0242***	-0.0182***	-0.0183***
	(0.0118)	(0.0116)	(0.0113)	(0.00151)	(0.00187)	(0.00160)
(Gov Bond Holdings$_{t-1}$)*(Earthquake)	-0.0681***	-0.0689***	-0.0698***	-0.0324***	-0.0331***	-0.0304***
	(0.0243)	(0.0246)	(0.0252)	(0.00884)	(0.00814)	(0.00576)
(Gov Bond Holdings$_{t-1}$)*(Asia)		-0.0590	-0.0608	0.0354	0.0336	0.0336
		(0.0412)	(0.0421)	(0.0287)	(0.0282)	(0.0313)
(Gov Bond Holdings$_{t-1}$)*(Russia)			-0.0333	-0.0102	-0.0108	-0.0108
			(0.0238)	(0.0204)	(0.0202)	(0.0194)
(Gov Bond Holdings$_{t-1}$)*(2001 Crisis)					-0.0421***	-0.0420***
					(0.00413)	(0.00591)
Observations	10119	10119	10119	10119	10119	10119
BankFixedEffects	Yes	Yes	Yes	Yes	Yes	Yes
MonthFixedEffects	Yes	Yes	Yes	Yes	Yes	Yes
BankQuarterFixedEffects	No	No	No	Yes	Yes	Yes
TripleCluster	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variable is loans to the private sector, in ratio to total assets. Earthquake is a dummy that takes a value of one from August 1999 to November 1999. Column (6) defines Earthquake as August 1999 to October 1999, for robustness. Asia is a dummy that takes a value of one from July 1997 to October 1997. Russia is a dummy that takes a value of one from August 1998 to November 1998. 2001 Crisis is a dummy that takes a value of one from December 2000 to December 2001. Variables are defined in Table II. Standard Errors are clustered at bank, month, and state-bank levels. * p $<$ 0.10, ** p $<$ 0.05, *** p $<$ 0.01

Table IX: Government Bonds and Credit Supply: Survivors and Controls

	(1)	(2)	(3)	(4)
Gov Bond Holdings$_{t-1}$	-0.0178***	-0.0176***	-0.0178***	-0.0182***
	(0.00208)	(0.00216)	(0.00233)	(0.00318)
Capital Ratio$_{t-1}$		-0.0187***	-0.0188***	-0.0183***
		(0.00164)	(0.00216)	(0.00212)
Non-Performing Loans$_{t-1}$				-0.609***
				(0.188)
Cash Holdings$_{t-1}$			0.258***	0.252***
			(0.0753)	(0.0774)
(Gov Bond Holdings$_{t-1}$)*(Earthquake)	-0.0202**	-0.0207***	-0.0202***	-0.0189***
	(0.00802)	(0.00736)	(0.00718)	(0.00526)
(Capital Ratio$_{t-1}$)*(Earthquake)		0.00774	0.00794	0.00754
		(0.0100)	(0.00856)	(0.00884)
(Non-Performing Loans$_{t-1}$)*(Earthquake)				0.0798
				(0.309)
(Cash Holdings$_{t-1}$)*(Earthquake)			0.123	0.0983*
			(0.101)	(0.0585)
Observations	8590	8586	8578	8578
Bank Fixed Effects	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes
Bank Quarter Fixed Effects	Yes	Yes	Yes	Yes
Triple Cluster	Yes	Yes	Yes	Yes

Dependent variable is loans to the private sector, in ratio to total assets. Sample consists of all banks, except those that have ever been taken over by the central bank. Earthquake is a dummy that takes a value of one from August 1999 to November 1999. Variables are defined in Table II Standard Errors are clustered at bank, time, and state-bank levels. * p < 0.10, ** p < 0.05, *** p < 0.01

Table X: Government Bonds and Credit Supply: Placebo Earthquake and Short Sample

	(1) Placebo	(2) Short Sample
Gov Bond Holdings$_{t-1}$	-0.0185***	-0.215***
	(0.00179)	(0.00982)
(Gov Bond Holdings$_{t-1}$)*(Earthquake)		-0.0592***
		(0.0124)
(Gov Bond Holdings$_{t-1}$)*(Asia)	0.0337	-0.0242
	(0.0281)	(0.0367)
(Gov Bond Holdings$_{t-1}$)*(Russia)	-0.0108	0.0125
	(0.0197)	(0.0145)
(Gov Bond Holdings$_{t-1}$)*(2001 Crisis)	-0.0418***	-0.0547*
	(0.00520)	(0.0329)
(Gov Bond Holdings$_{t-1}$)*(Placebo)	-0.00878	
	(0.00543)	
Observations	10119	5069
Bank Fixed Effects	Yes	Yes
Month Fixed Effects	Yes	Yes
Bank Quarter Fixed Effects	Yes	No
Triple Cluster	Yes	Yes

Dependent variable is loans to the private sector, in ratio to total assets. Earthquake is a dummy that takes a value of one from August 1999 to November 1999. Placebo is a dummy that takes a value of one from April 1999 to July 1999. Asia is a dummy that takes a value of one from July 1997 to October 1997. Russia is a dummy that takes a value of one from August 1998 to November 1998. 2001 Crisis is a dummy that takes a value of one from December 2000 to December 2001. Short sample is from 1997-2002. Variables are defined in Table II. Standard Errors are clustered at bank, month, and state-bank levels. * p < 0.10, ** p < 0.05, *** p < 0.01

Table XI: Government Bonds and Credit Supply: Foreign Banks Lending Outside Turkey

	(1)	(2)	(3)
Gov Bond Holdings$_{t-1}$	-0.0210*	-0.0196*	-0.0196
	(0.0740)	(0.0770)	(0.0136)
(Gov Bond Holdings$_{t-1}$)*(Earthquake)	-0.0292***	-0.0291***	-0.0291**
	(0.00976)	(0.00962)	(0.0156)
(Gov Bond Holdings$_{t-1}$)*(2001 Crisis)	-0.115***	-0.116***	-0.116***
	(0.0155)	(0.0155)	(0.0331)
(Gov Bond Holdings$_{t-1}$)*(Russia)	-0.00266	-0.00300	-0.00300
	(0.0217)	(0.0217)	(0.0260)
(Gov Bond Holdings$_{t-1}$)*(Asia)		-0.0178	-0.0178
		(0.0157)	(0.0242)
Observations	2715	2715	2715
Bank Fixed Effects	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes
Bank Quarter Fixed Effects	Yes	Yes	Yes
Double Cluster	No	No	Yes

Sample is all banks that were majority foreign owned at the time they entered the sample. Dependent variable is loans to the private sector, in ratio to total assets. Earthquake is a dummy that takes a value of one from August 1999 to November 1999. Asia is a dummy that takes a value of one from July 1997 to October 1997. Russia is a dummy that takes a value of one from August 1998 to November 1998. 2001 Crisis is a dummy that takes a value of one from December 2000 to December 2001. Variables are defined in Table II. Standard Errors are clustered at the month level. Double clustered regressions are clustered at bank and month levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table XII: Valuation and Profits

	(1) Valuation	(2) Valuation	(3) Profits	(4) Profits
Gov Bond Holdings$_{t-1}$	-0.0425***	-0.0251*	-0.00403***	-0.0000465
	(0.0123)	(0.0144)	(0.000999)	(0.00111)
(Gov Bond Holdings$_{t-1}$)*(Earthquake)	-0.0455***	-0.0640***	-0.0159***	-0.0163**
	(0.0106)	(0.0103)	(0.00373)	(0.00645)
(Gov Bond Holdings$_{t-1}$)*(2001 Crisis)		-0.134***		-0.0279***
		(0.0152)		(0.0106)
Observations	10057	10057	10115	10115
Bank Fixed Effects	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes
Bank Quarter Fixed Effects	No	No	Yes	Yes
Triple Cluster	Yes	Yes	Yes	Yes

Dependent variable in columns (1) and (2) is financial assets valuation difference as a ratio to total assets, winsorized at 5% (multiplied by 100). Dependent variable in columns (3) and (4) is Profits in ratio to total assets, winsorized at 2%. Earthquake is a dummy that takes a value of one from August 1999 to November 1999. Asia is a dummy that takes a value of one from July 1997 to October 1997. Russia is a dummy that takes a value of one from August 1998 to November 1998. 2001 Crisis is a dummy that takes a value of one from December 2000 to December 2001. Variables are defined in Table II. Standard Errors are clustered at bank, month, and state-bank levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table XIII: Appendix Table: Survivors without Bank-Quarter Effects

	(1)	(2)	(3)	(4)
Gov Bond Holdings$_{t-1}$	-0.314***	-0.333***	-0.328***	-0.324***
	(0.00533)	(0.00785)	(0.00979)	(0.00753)
Capital Ratio$_{t-1}$		-0.172***	-0.163***	-0.163***
		(0.00459)	(0.00431)	(0.00426)
Non-Performing Loans$_{t-1}$				0.369
				(0.409)
Cash Holdings$_{t-1}$			1.626***	1.648***
			(0.107)	(0.124)
(Gov Bond Holdings$_{t-1}$)*(Earthquake)	-0.105***	-0.0648**	-0.0605***	-0.0535***
	(0.0381)	(0.0313)	(0.0232)	(0.0194)
(Capital Ratio$_{t-1}$)*(Earthquake)		0.0265	0.00366	0.00496
		(0.0220)	(0.0125)	(0.0135)
(Non-Performing Loans$_{t-1}$)*(Earthquake)				0.293
				(0.303)
(Cash Holdings$_{t-1}$)*(Earthquake)			-2.176***	-2.320***
			(0.359)	(0.272)
Observations	8590	8586	8578	8578
R^2	0.746	0.759	0.760	0.760
Bank Fixed Effects	Yes	Yes	Yes	Yes
Month Fixed Effects	Yes	Yes	Yes	Yes
Bank Quarter Fixed Effects	No	No	No	No
Triple Cluster	Yes	Yes	Yes	Yes

Dependent variable is loans to the private sector, in ratio to total assets. Sample consists of all banks, except those that have ever been taken over by the central bank. Earthquake is a dummy that takes a value of one from August 1999 to November 1999. Variables are defined in Table II Standard Errors are clustered at bank, time, and state-bank levels. * p < 0.10, ** p < 0.05, *** p < 0.01