The Effect of TARP on Bank Risk-Taking

PRELIMINARY – PLEASE DO NOT QUOTE

Lamont Black and Lieu Hazelwood*
Board of Governors of the Federal Reserve System
Washington, DC 20551

September 2011

ABSTRACT:

One of the largest responses of the U.S. government to the recent financial crisis was the Troubled Asset Relief Program (TARP). TARP was originally intended to stabilize the financial sector through the increased capitalization of banks. However, recipients of TARP funds were then encouraged to make additional loans despite increased borrower risk. In this paper, we consider the effect of the TARP capital injections on bank risk-taking by analyzing the risk ratings of banks' commercial loan originations during the crisis. The results indicate that, relative to non-TARP banks, the risk of loan originations *increased* at large TARP banks but *decreased* at small TARP banks. Interest spreads and loan levels also moved in different directions for large and small banks. For large banks, the increase in risk-taking without an increase in lending is suggestive of moral hazard due to government ownership. These results may also be due to the conflicting goals of the TARP program for bank capitalization and bank lending.

Keywords: Banking; Government regulation; Macroeconomic stabilization policy
JEL Classifications: G21, G28, E61

* The authors would like to thank Rochelle Edge, Philipp Hartmann, Dmytro Holod, Christopher James, Skander Van den Heuvel, and participants at seminars at the Bocconi 2010 CAREFIN conference, Midwest Finance Association 2010 Annual Meeting and FDIC/JFSR 11th Annual Bank Research Conference for helpful comments and suggestions. All remaining errors are our own. Please address correspondence to Lamont Black – phone: 202-452-3152, email: lamont.black@frb.gov. The views expressed are those of the authors and do not necessarily reflect those of the Board of Governors of the Federal Reserve System or its staff.

1. Introduction

The Troubled Asset Relief Program (TARP), a program of the U.S. Treasury to purchase equity in financial institutions and recapitalize the financial sector, was the largest of the U.S. government's measures implemented in 2008 to address the financial crisis. The provision for TARP by Congress allowed the Treasury to purchase or insure up to $700 billion of troubled assets or to purchase equity in the banks themselves. On October 28, 2008, Treasury Secretary Henry Paulson authorized the first wave of TARP equity capital injections for nine of the largest banks.[1] Shortly thereafter, more banks received funds from the government under the TARP program.

The original focus of TARP appears to have been stabilization of the banking sector. In this respect, TARP was designed to improve the safety and soundness of the banking system through increased capitalization. Hoshi and Kashyap (2010) describe how these efforts were similar to those used to stabilize Japanese banks in the 1990s. The Emergency Economic Stabilization Act (EESA) passed by Congress in 2008, which created TARP, also included specific provisions aimed at reducing the "excessive risk-taking" that was believed to have contributed to the financial crisis.

Public discourse subsequent to the program's implementation revealed that TARP was implicitly expected to increase bank lending. Shortly after the first round of injections in October 2008, Anthony Ryan, Acting Treasury Under Secretary for domestic finance, said in a speech: "As these banks and institutions are reinforced and supported with taxpayer funds, they must meet their responsibility to lend" (Ryan, 2008). Figure 1 shows that total commercial and industrial loans in the U.S. began to fall dramatically near the end of 2008, which is also the window of time in which the Treasury began making capital infusions into banks under the TARP program. The following year, a congressional oversight panel charged with evaluating the TARP program issued a report which criticized the U.S. Treasury for having no ability to ensure that banks were lending the money that they received from the government (Congressional Oversight Panel, 2009).

[1] The bank holding companies included Bank of America, Bank of NY Mellon, Citigroup, J.P. Morgan Chase, State Street, and Wells Fargo.

To expand lending during an economic downturn would likely require banks to increase the riskiness of their lending. Government ownership of banks may facilitate the financing of beneficial projects that private banks would be unable or unwilling to finance otherwise (Stiglitz, 1993) and, as such, government-owned banks should mitigate the restriction of credit supply by increasing their lending during recessions. According to this theory, government-owned banks address market failures and improve social welfare. However, implicit or explicit government protection also provides a subsidy to government-owned banks that can induce excessive risk-taking. Increased risk-taking in the absence of increased lending may be the result of moral hazard.

The conflicted nature of the TARP objectives reflects the tension between different approaches to the financial crisis. While recapitalization was directed at returning banks to a position of financial stability, these banks were also expected to convert their new cash into risky loans. TARP was a use of public tax-payer funds and some public opinion argued that the funds should be used to make loans, so that the benefit of the funds would be passed through directly to consumers and businesses. Similarly, during the 2007-2009 financial crisis, many European banks were bailed out by their national governments through a range of provisions that included equity capital injections.[2] As in the U.S., this partial nationalization of large banking groups revived the debate concerning the benefits and costs of bank government ownership.

Given the conflicted nature of these objectives, it is an open question as to how TARP might have affected risk-taking incentives relative to changes in bank lending. In this paper, we try to empirically identify the effect of TARP on bank risk-taking. One of the areas of activity in which the TARP capital infusions might have an effect on bank risk-taking is in commercial and industrial (C&I) lending. Using data from the Survey of Terms of Business Lending (STBL), we examine the lending patterns of both TARP and non-TARP recipients around the time of the TARP capital infusions. We use the STBL data because they contain risk rating information on a quarterly measure of loan originations for a broad sample of US banks of various sizes. By using the STBL we can analyze data on loan originations and risk before and after TARP infusions. Specifically,

[2] This led to an increased role of European governements in banks such as Royal Bank of Scotland and Lloyds in the UK, ABN Amro in The Netherlands, Allied Irish Bank in Ireland, Dexia in Belgium, Hypo Real Estate in Germany, and Fortis in the Benelux (Iannotta et al., 2011).

we identify how the risk ratings of commercial loan originations at TARP banks change relative to non-TARP banks in response to the TARP capital infusions.

In our analysis, we first use an event-study methodology to evaluate the effect of TARP on the average risk ratings of commercial loan originations. One challenge in taking this approach is that the type of commercial loan originations can differ significantly by bank size. To control for some of these differences, we stratify the sample by bank size and compare TARP and non-TARP recipients by size class. In the second part of our analysis, we use loan-level regressions to evaluate whether TARP banks changed the average riskiness of their loan originations after receiving TARP funds.

Our results indicate that TARP had a surprising effect on bank risk-taking. In our event study and in our regression results, we find evidence that the average risk of loan originations at large TARP banks *increased* relative to non-TARP banks through 2009 whereas the average risk at small TARP banks *decreased* relative to non-TARP banks. Evidence also indicates that the interest spreads on loans from the large TARP banks increased substantially following the injections.

This may reflect the conflicting influences of government ownership on bank behavior. Although TARP money was given to increase bank stability and reduce incentives to take excessive risks, it was also given with the understanding that the funds would be used to expand lending during a period of increased risk. These two objectives have an opposing influence on bank risk-taking that may have led to a different effect of TARP on lending by large and small banks. Large banks may also have been more susceptible to the moral hazard associated with government bailout funds.

The remainder of our paper is organized as follows: Section 2 reviews the related literature and Section 3 describes the data construction and descriptive statistics. Section 4 describes the methodology and results for the event-study and loan-level regression analysis used to compare risk-taking at TARP banks to non-TARP banks, including several robustness exercises. Section 5 concludes.

2. Related Literature

TARP was the first program in U.S. history to make large government capital injections into privately-owned banks. Although the banks were not nationalized, the injections were large enough for the government ownership to possibly have an effect on the risk profile of the banks during the crisis. Several papers have used international data to investigate how government capital injections affect banks' lending and risk shifting. Micco and Panizza (2006) point out that government-owned banks may stabilize credit because the government internalizes the benefits of a more stable macroeconomic environment. They find that the lending of government-owned banks is less responsive to macroeconomic shocks than the lending of private banks, suggesting that government-owned banks play a credit smoothing role over the business cycle. Focusing on the recent crisis, Iannotta et al. (2011) examine the effect of bank capital injection on lending and risk taking in western Europe from 2000-2009. Counter to the stabilization hypothesis, the authors find that government-owned banks did not increase lending during economic downturns. The results for risk show that the government-owned banks had a lower default rating, but this was primarily due to the explicit or implicit government guarantees.

Several papers investigate the relationship between government ownership and banks' risk-shifting. There is clearly a moral hazard problem when government funds are used to generate shareholder value. Wilson and Wu (2010) find that banks' voluntary paricipation in a preferred stock recapitalization does not necessarily guarantee that the capital infusion and the taxpayer subsidy will induce the banks to make good loans. Hence, the banks may still choose to shift the risk to their creditors. This suggests that the size of the capital injection and the lack of any leverage-increasing prohibitions may have caused the inefficiency in the TARP program.

Our paper is most closely related to that of Duchin and Sosyura (2011), who use different data sources to analyze the effect of TARP on bank lending and risk-taking. Similar to our findings, the authors find no evidence of greater credit origination by TARP participants relative to non-participants with similar characteristics. The results also indicate that the TARP banks approve riskier loans, even after controlling for the selection of TARP banks based on political connections (Duchin and Sosyura, 2010).

Our paper complements their findings by contrasting the results for large and small banks.

We analyze the effect on risk-taking by using a measure of risk-taking that is particularly suited to banking. The literature on bank risk-taking includes measures of bank risk based on credit risk, default risk, equity risk, value-at-risk, return on assets, balance sheet measures of bank risk, and supervisory ratings. For instance, Salas and Saurina (2003) use a measure of credit risk based on the proportion of loan losses over total loans, Gonzalez (2005) uses a measure based on non-performing loans to total bank loans and Jimenez, Lopez, and Saurina (2007) use a measure based on commercial non-performing loans (NPL) ratios which is an ex-post measure of credit risk. One shortcoming of these measures is that they are backward-looking, which makes them less useful for evaluating the effect of a program like TARP. In contrast, we use risk ratings on new loan originations. The advantage of our measure is that it can show how the risk characteristics of current loan originations change in response to the program.[3]

To improve this measure of risk taking, we also control for the amount of corporate draw-downs of lines of credit. This was especially important during the financial crisis (Ivashina and Scharfstein, 2010) and is an important issue when trying to control for changes in loan composition driven by borrower demand (Jimenez et al., 2009). Banks have an advantage in hedging liquidity risk, which makes them ideal liquidity providers during periods of financial distress (Kashyap, Rajan and Stein, 2002; Gatev and Strahan, 2006). As the commercial paper market dried up, many firms borrowed from existing lines of credit at banks as a source of funds. Clearly, these shifts in loan demand can affect loan originations apart from changes in banks' risk-taking incentives. By focusing on spot originations, we will be able to more clearly identify changes in banks' lending standards.

Lastly, the paper relates to executive compensation practices of large financial institutions. The Emergency Economic Stabilization Act of 2008 (EESA), which funded the TARP program, included several provisions meant to reduce excessive risk-taking through changes to executive compensation. EESA removed the IRS 162m tax incentive for "performance-based pay," which contributed to the use of incentive compensation in

[3] This also points to the likely effect of the TARP infusion on future loan losses.

the form of bonuses, and mandated that compensation committees review executive compensation policies for features that may induce excessive risk-taking.[4] These provisions apply to all TARP recipients while the Treasury holds an equity or debt position in the bank (EESA, 2008). So far, the evidence on executive compensation and bank risk-taking in the financial crisis has been mixed (e.g., Fahlenbrach and Stulz 2009, DeYoung et al. 2009).

Overall, our paper provides several contributions to the current literature. Our paper documents the risk profile and lending behavior of U.S. banks following government-capital injections during the financial crisis. Other studies have often looked at government ownership in non-U.S. countries during non-crisis periods and the focus has been on performance rather than risk-taking. Our paper also captures a change from private-ownership to government-ownership, whereas other studies have compared the cross-sectional differences between government-owned banks and private banks. Lastly, our paper uses a forward-looking measure of risk that is particularly suited to banking. This is especially important because it can assess the effect of TARP capital injections on bank lending standards.

3. Data and Descriptive Statistics

Our primary data are from the Survey of Terms of Business Lending (STBL). The STBL is a panel survey conducted by the Federal Reserve each quarter consisting of a stratified sample of insured commercial banks and U.S. branches and agencies of foreign banks. The STBL collects data on gross commercial and industrial (C&I) loan originations made during the first full business week in the middle month of each quarter. The data are used for policy purposes to estimate the terms of loans extended during that week by banks in the survey. The authorized size for the survey is 348 domestically chartered commercial banks and 50 U.S. branches and agencies of foreign banks.

[4] This provision falls under section 111(b)(2)(A) of EESA. Within 90 days of receiving TARP funds, the financial institution's compensation committee must review the incentive compensation arrangements of its senior executive officers (SEOs) with the institution's senior risk officers to ensure that these arrangements do not encourage the SEOs to take unnecessary and excessive risks that threaten the value of the financial institution. Thereafter, the compensation committee must meet at least annually with senior risk officers to undergo a similar process.

We analyze over two years of STBL data from November 2007 through August 2010. We include these dates in order to span the periods of the financial crisis as well as the TARP capital injections. This provides a picture of how bank and loan characteristics, including loan risk, changed from the period before the TARP injections to the period after the TARP injections.

We combine these data with information from the U.S. Treasury Department on the identity of TARP recipients from November 2007 through January 16, 2009. The TARP program was directed primarily at bank holding companies (BHCs) but also included a few banks. In total, there were 441 TARP recipients during this time period. The Treasury information includes the identity and location of the institution, the date the institution received TARP funds, and the amount of the funds received. None of the banks which we identified as "non-TARP" banks as of January 16, 2009 received TARP funds through December 2009.[5]

The National Information Center (NIC) data identifies the "topholder" of banks, which is the ultimate owner of a bank. In many cases, this is a bank holding company. Because previous research indicates that banks within a bank holding company coordinate their activities through internal capital markets (e.g., Campello, 2002), we use NIC to construct a data set at the topholder level, which is the combined Call Report data for each bank within each bank holding company.[6] We use topholders as of the fourth quarter 2008. Out of the 360 banks in the STBL panel, we matched 295 banks to NIC.

Because we wanted to examine the periods prior to, during, and after the crisis, we chose to keep only banks that were in all 12 quarters of the STBL survey. The STBL panel of smaller banks consists of a stratified random sample which is not fixed from quarter to quarter. In order to include both the pre and post crisis period, we significantly reduced our sample from 295 banks to 81 banks. Using the STBL, NIC, and the Treasury data, we construct a subsidiary level file that includes 37 TARP banks and 44 non-TARP banks. TARP recipients are identified by Treasury and non-TARP banks are banks in the STBL not identified by Treasury. After removing observations with missing loan maturity, this gives us 187,761 loan-level observations.

[5] The TARP participant data was unavailable after December 2009.
[6] Based on NIC, we then use the identity of the topholder to construct a data set at the subsidiary level.

We divide our TARP and non-TARP banks based on total assets, which are available through Call Report data. Banks of different sizes may have different risk profiles; therefore, separating banks by size helps to analyze the effect on different risk groups. The three asset categories we use are as follows: Large (>$10 Billion), Medium ($10 Billion to $2.5 Billion), and Small (<$2.5 Billion). We match non-TARP banks to TARP banks based on bank size. Because banks of different sizes received TARP capital infusions at roughly the same time, this allows us to compare TARP and non-TARP banks based on the periods before and after the TARP capital infusions. For the largest size group, we have 13 non-TARP banks and 17 TARP banks; for the medium size group, we have 7 non-TARP banks and 13 TARP banks; and, lastly for the smallest size group, there are 24 non-TARP banks and 7 TARP banks.

Table 1 shows the descriptive statistics for the loan and bank characteristics used in our analysis. The statistics are subdivided for non-TARP and TARP recipients as well as for the period before and after the TARP capital infusions. By splitting the data along these two dimensions, we can report the difference between TARP to non-TARP banks (column 3) and the difference between the period before and after the TARP infusions (row 3). The bottom right part of table (column 3, row 3) shows the difference-in-difference results, which indicates how TARP banks differ from non-TARP banks after the capital infusions *relative to* their difference prior to the capital infusions. Because selection for receiving TARP funds was an endogenous choice by the Treasury, it is important to control for inherent differences between TARP and non-TARP banks.

Our key variable is the risk rating of each loan issued by a bank in the STBL sample.[7] The risk rating variable is defined as follows: minimal risk = 1, low risk = 2, moderate risk = 3, acceptable risk = 4, special mention or classified asset = 5, such that the risk rating is an index that increases with risk. We eliminate cases where the risk rating is zero (no risk) or missing. It is interesting to note that the average risk rating of loan originations at the TARP banks is significantly greater than the average risk rating of loan originations at the non-TARP banks both before and after the TARP injections. This unconditional mean indicates that, over the time horizon of November 2007 to August 2010, banks that received TARP funds were originating higher-risk commercial loans.

[7] The STBL began including bank-reported risk ratings for each loan in May 1997.

The bottom of column 3 shows that this difference increased with the TARP injections for TARP recipients.

The other loan characteristics are commitment, maturity and the log of loan size. The commitment variable identifies whether a loan was made under commitment. It is a dummy variable equal to 1 if the amount of commitment is greater than zero and 0 otherwise. This is an important demand-side control, because loans extended under commitment do not reflect current "risk-taking" by the bank. The maturity variable is the months to maturity. The log of the loan size is the log size of the loan in dollar amount. Prior to May 2006, the STBL did not include loans less than $1,000. In May 2006, the minimum size of loans reported in the STBL was increased to $3,000. Therefore we eliminate any loans less than $3,000 from our analysis. The mean values for each of these variables, except for commitment, are significantly different between the TARP and non-TARP banks at the 1% level before and after the TARP infusions. Over the thirty five month time horizon of November 2007 to August 2010, TARP banks were originating smaller loans with shorter maturity that was more likely to be made under commitment. The difference-in-difference calculation shows that, after the capital injections, the TARP banks originated even smaller and shorter maturity loans relative to the non-TARP banks. The number of loans made under commitment by TARP banks decreased relative to non-TARP banks.

The bank characteristics are the log of bank size and capitalization. Bank size is simply measured as total assets and capitalization is the ratio of total bank equity capital to bank size. Both of these characteristics are taken from the Call Report, so the values are lagged relative to the timing of the STBL survey. Note that the measure of bank equity includes "preferred stock," which was the form of the TARP capital infusions into the bank holding companies. Column 3 shows that the TARP banks were larger than non-TARP banks on average and became larger relative to non-TARP banks after the government assistance. Interestingly, the TARP banks were less capitalized than the non-TARP banks prior to the infusions, but became relatively less capitalized after the infusions. This suggests that these banks suffered larger losses in the later period of the sample.

4. Empirical Methodology and Results

We use two approaches to evaluate the effect of TARP on bank risk-taking in more detail. Our first approach uses a basic event-study analysis to examine the change in the average risk of loan originations for TARP recipients compared to non-TARP recipients. The second approach uses the loan-level data to see if the injection of TARP funds affected risk-taking after controlling for other factors. We then consider the effect on interest spreads and the size of the effects based on the size of the capital infusions.

4.1 Change in Relative Risk Ratings

We use our stratification of banks into three bank size categories (Large, Medium, and Small) to compare changes in risk-taking after the TARP capital infusions. Figure 2 illustrates the relative average risk of C&I loan originations across banks that received TARP capital and banks that did not receive TARP capital infusions. Each average risk time-series is normalized to be zero at the time of TARP capital infusions. The date of the TARP capital infusions for each size category is the basis for the relative time periods, which is also used for the matching sample of non-TARP banks. Using this setup, we can identify the changes in risk-taking by TARP banks relative to non-TARP banks following the capital infusions. We also examine the behavior of non-TARP banks in relation to TARP banks to assess general trends.

The first panel of Figure 2 illustrates that the average risk rating of loan originations by large TARP and non-TARP banks increased after the TARP capital infusion period. The non-TARP banks had a consistently lower average risk prior to and after the TARP capital infusion date. After the infusion period, both TARP and non-TARP banks both showed a steady increase in their risk profile with the TARP banks having a consistently higher risk rating over the non-TARP banks.

The medium size banks, illustrated in the second panel of Figure 2, show a slightly smaller increase in risk-taking. In the quarter after the capital infusion, both the TARP and non-TARP banks increase their risk rating at a similar rate. After the first quarter, the non-TARP banks appear to continue to increase their risk profile while the TARP banks show a slight decrease in their risk profile. Overall, the ratings at TARP banks are consistently higher than those at non-TARP banks and the non-TARP ratings

remain relatively flat over the time horizon. In the case of the medium-sized banks, it appears that the TARP capital infusion may have contributed to slightly greater risk-taking.

As shown in the third panel, the small TARP recipients decreased the risk of their loan originations directly following the TARP capital infusion while the non-TARP banks had an increase in their risk profile. The TARP risk rating is consistently lower than the non-TARP risk rating following the TARP capital infusion period in Figure 2. This is the first evidence that the TARP capital infusions may have reduced risk-taking among the small banks.

Table 2 provides the relevant quantities as depicted in Figure 2. As shown in column 3, the average risk rating of loans originated by large TARP banks increased by 0.155 over that of non-TARP banks following the timing of the infusions. In contrast, among small banks, the average risk rating of TARP originations decreased by 0.159 relative to non-TARP banks. The medium-sized TARP banks also show a significant increase in risk ratings relative to their non-TARP peers, but the difference is smaller.

In our second analysis, we do a loan-level regression analysis on the characteristics of banks' risk-taking to control more closely for other factors. The main hypothesis we want to test is whether the risk ratings of loan originations by TARP banks changed after the TARP infusions while controlling for other bank and loan characteristics. This is the hypothesis that the injection of TARP funds will affect a bank's risk-taking incentives. To test this, we estimate the following full specification:

$$\begin{aligned} risk_{i,t,l} = {} & \beta_1 TARP\ recipient_{i,t} + \beta_2 Ln(Bank\ Size)_{i,t-1} + \beta_3 Capitalization_{i,t-1} + \\ & \beta_4 Commitment_{l,t} + \beta_5 Maturity_{l,t} + \beta_6 Ln(Loan\ Size)_{l,t} + \\ & \beta_7 Secured_{l,t} + \beta_8 Floating_{l,t} + \alpha_1 bank_i + \alpha_2 quarter_t + \varepsilon_{i,l,t} \end{aligned} \tag{1}$$

The results are also shown for a specification excluding the loan characteristics.

In this baseline regression model, we define the dependent variable as the risk rating given in the STBL. The key explanatory variable is "TARP Recipient" which is a dummy variable with a value of one when a bank becomes a TARP recipient. The additional explanatory variables include other bank and loan characteristics that may be

related to risk-taking. We include quarter dummies to control for any aggregate effects of the financial crisis in each quarter and we include bank fixed effects to control for heterogeneity that is constant over time and correlated with risk. Because the regression includes bank fixed effects, the identification comes from a within-bank change in the risk of loan originations. The inclusion of the bank fixed effects (bank *i*) and time fixed effects (quarter *t*) produces a difference-in-differences estimate of the effect of the TARP infusions on the riskiness of loan originations, controlling for pre-existing differences across banks. The coefficient β_1 measures how much the riskiness of lending by TARP recipients changed relative to non-TARP recipients after the TARP infusions.

Table 3 shows the regression results for risk-taking. The data are first divided by bank size, as in the event study, to control for overall differences in business strategies. The grouping of columns indicate the subsamples of data for large, medium, and small banks. Within each subsample, we consider two specifications of the regression model. The first column includes only bank characteristics and fixed-effects by banks and time. The second column within each grouping adds the loan characteristics.

The results after controlling for these other factors confirm the basic results of the event study. In considering the coefficient on TARP recipient for large banks, it is clearly positive and significant at the 1% level. This indicates that the risk rating on C&I loan originations by TARP banks increased after the TARP infusions relative to non-TARP banks. Adding the loan characteristics in column 2 decreases the magnitude of the TARP coefficient, but it is still significant at the 1% level. In column 2, the coefficient of 0.079 indicates an increase of 0.079 in the average risk rating of TARP loans relative to the TARP pre-infusion average risk rating of 3.368. This appears to be relatively small in economic significance, but it is noteworthy given that it is a relative increase in the risk rating rather than a decrease in the risk rating. For medium banks, columns 3 and 4 also indicate a relative increase in risk rating for TARP recipients. However, the increase in risk ratings is only about half the amount for large banks. The coefficient on TARP recipient for small banks is consistently negative and significant. As in the event study, this implies that small TARP recipients decreased their risk-taking relative to other small non-TARP recipients following the capital infusions. In column 6, the coefficient of −0.087 indicates a decrease of 0.087 in the risk rating relative to the TARP pre-infusion

average risk rating of 3.368. This appears to be a change of slightly larger economic significance for the small banks relative to the large banks.

The other explanatory variables have a significant relationship with risk ratings in some of the specifications. Among the bank characteristics, larger bank size appears to be associated with higher risk ratings for large banks, but lower risk ratings for medium banks. On the other hand, greater capitalization is consistently associated with higher risk ratings.

Among the loan characteristics, commitment draw-downs are associated with a significantly higher risk rating at large banks. An increase in loan size and loan maturity is associated with a significant decrease in the risk of the loan at large and medium-sized banks. Finally, the risk rating tends to be higher on secured and floating loans as well. The power of the tests for small banks may be limited due to the smaller number of loans being originated.

As a robustness check, we also report the results for this same analysis using an ordered logit specification. Table 4 shows these results. The ordered logit is valuable in this approach, because the dependent variable of the risk rating has an ordered value of 1 through 5. The results are reported as odds ratios, so a ratio of greater than 1 indicates that the variable is associated with a higher value of the dependent variable. Columns 2 and 6 of Table 4 show that large TARP recipients were more likely to originate riskier loans and small TARP recipients were more likely to originate safer loans. These results support the findings in Table 3. The results for the TARP infusion differ for medium banks, but this may be due to the inability to use bank fixed effects in the ordered logit specification.

4.2 Change in Relative Interest Rate Spread

Related to changes in risk rating, it would also be helpful to know whether interest rate spreads on loan originations at TARP recipients changed following the TARP capital infusions. This provides additional information about how the banks changed the pricing on their loans along with the risk profile.

The nominal interest rate of the loan is one of the loan characteristics recorded in the STBL. The respondent banks also indicate whether the interest rate was over prime

and provide their prime rate during the week in which the loan was made. This allows us to compute the "interest spread" for these loans, which is the spread over prime. We restrict the following analysis to this sample of prime-based loans, which is about 60% of the loans in the original sample.

Figure 3 shows a similar analysis to Figure 2, but applied to interest rate spreads. The three panels separate the sample by bank size, the red lines show the average interest rate spread at TARP banks, and the blue lines show the average interest rate spread at non-TARP banks. The first impression from Figure 3 is the large increase in interest rate spreads at large TARP banks relative to large non-TARP banks. While all large banks had similar interest rate spreads before TARP, the spreads at TARP banks widened substantially following the injections, whereas the spreads at the non-TARP banks remained relatively unchanged.

The increase in interest rate spreads at the large TARP banks appears to correspond with the increase in the risk rating of loan originations by large TARP banks. This would suggest that these banks began charging higher rates in line with the greater risk associated with the loans.

The panels for medium and small banks in Figure 3 indicate that interest spreads did not substantially differ at TARP and non-TARP banks in these size categories. For medium-sized banks, interest spreads at TARP banks decreased slightly relative to non-TARP banks following the capital infusions. This highlights an interesting distinction between the large and medium TARP recipients.

To analyze these changes in interest rate spreads while controlling for other factors, we use a similar regression analysis as before. In this analysis, we use interest spread as the dependent variable:

$$\begin{aligned} \textit{Interest Spread}_{i,t,l} = {} & \beta_1 \textit{TARP recipient}_{i,t} + \beta_2 \textit{Ln(Bank Size)}_{i,t-1} + \\ & \beta_3 \textit{Capitalization}_{i,t-1} + \beta_4 \textit{Risk Rating}_{l,t} + \\ & \beta_5 \textit{Commitment}_{l,t} + \beta_6 \textit{Maturity}_{l,t} + \beta_7 \textit{Ln(Loan Size)}_{l,t} + \\ & \beta_8 \textit{Secured}_{l,t} + \beta_9 \textit{Floating}_{l,t} + \alpha_1 \textit{bank}_i + \alpha_2 \textit{quarter}_t + \varepsilon_{i,l,t} \end{aligned} \tag{2}$$

The important addition here is the risk rating among the explanatory loan characteristics.

Table 5 shows the results for the regression specification in equation 2. As before, we split the sample into the three categories by bank size and show two specifications for each size category, with and without loan characteristics. The results for TARP recipients are in line with the descriptive analysis in Figure 3. The interest rate spreads on loan originations by large TARP banks increased by over 50 basis points relative to non-TARP banks. This contrasts with medium-sized TARP recipients, where interest rate spreads significantly decreased relative to non-TARP banks. The specification for small banks controlling for loan characteristics suggests that interest rate spreads increased slightly following the TARP infusions.

4.3 Change in Relative Level of C&I Loans

There has been significant debate about how bank lending changed during the financial crisis (Chari, Christiano and Kehoe, 2008). As part of this debate, questions have been raised about how much of the TARP funds were converted into loans. To address this issue, we show the levels of C&I loans outstanding at TARP and non-TARP banks in Figure 4. Similar to Figures 2 and 3, this figure shows the levels normalized to the value of zero at the time of the capital infusions. Interestingly, for large banks, the levels of TARP C&I loans declined dramatically relative to the non-TARP banks following the capital infusions. Only after about a year did the TARP levels begin to recover to the non-TARP levels.

This suggests two possible interpretations. For large banks, the pressure to expand lending and take on more risk may have taken some time and it may have caused TARP banks to lend more than they would have otherwise. It is certainly possible that the large TARP banks may have reduced lending even more in the absence of the capital infusions. Alternatively, it also points to moral hazard on the part of the large banks. Having received the government funds, it appears that the large banks originated higher-interest, higher-risk loans without increasing loan volume. For small banks, the level of C&I loans by TARP banks exceeded that of non-TARP banks following the capital infusions. This suggests that the small banks may have been able to convert the additional capital into loans without having to lend to riskier borrowers.

4.4 Robustness: Change in Risk based on Size of Infusion

In this final part of the analysis, we consider the degree of the effect of TARP on risk-taking based on the dollar amount of the capital infusion. The TARP process of capital replenishment allowed the Treasury to determine the amount of a bank's capital infusion based on the bank's application for funds as well as the bank's need for funds. This allowed the *degree* of the capital infusion to widely differ among TARP recipients.

To assess the response of risk-taking to the amount of the infusion, we use a regression analysis similar to equation 2, but replace the TARP Recipient variable with an alternative measure of the infusion. We consider the log of the dollar amount of the capital infusion. This approach provides an alternative measure of how much the capital infusion might affect the bank's risk-taking.

Table 6 shows the result of this analysis. For each size category, we report the results from the short and the full specification including loan characteristics and the measure of the degree of the TARP capital infusions. The results are largely consistent with those reported in Table 3 for the original analysis using the TARP dummy. For large banks, greater infusions in dollar amounts lead to an increase in the risk rating on future loan originations. In contrast, for small banks, greater infusions lead to lower risk ratings on future loan originations.

We also report the ordered logit results for these same specifications in Table 7. Again, the ordered logit coefficients are reported as odds ratios. The results indicate that larger capital infusions were associated with higher probabilities of risky loans for large TARP recipients. And, similar to the previous regressions, larger capital infusions were associated with lower probabilities of risky loans for small TARP recipients.

4.5 Robustness: Matched Pair Analysis

In order to reduce the selection bias caused by the non-random TARP assignment, we also match different groups (TARP participation) based on the propensity score probabilities within each size class. Using a logistic regression that mirrors the first regression in our study (1), we calculated the propensity scores of all the banks by size class. The propensity score is the probability of a bank receiving TARP funds, based on the bank's pre-treatment characteristics, including their risk profile. Within each size

class, TARP banks were assigned their corresponding non-TARP bank match based on the absolute difference in propensity scores. Pairs with the smallest difference were regarded as a matched pair and were selected to be part of our matched pair analysis sample.

Based on the matched pairs, we examined the average normalized post-treatment differences in the risk profiles within each size class. The infusion period for the large size class was November 2008 and the infusion period for the medium and small banks was February 2009. The average post-treatment difference in risk ratings was normalized for each matched pair by their treatment (infusion) average risk score and then the average across all matched pairs was calculated within size class. The average differences across matched pairs for the large, medium, and small size classes were 0.154 for large banks, 0.032 for medium banks, and -0.217 for small banks. This supports our previous findings that large TARP banks increased their risk ratings relative to large non-TARP banks whereas small TARP banks decreased their risk ratings.

Using only the matched pair sample, we repeated the loan-level regression analysis for risk-ratings in equation (1). The results are shown in Table 8. In column 2, the coefficient of 0.091 indicates an increase of 0.091 in the average risk rating of TARP loans relative to the TARP pre-infusion average risk rating. This is slightly larger than the full sample result of 0.079 and both results are significant at the 1% level. For medium banks, column 4 also indicates a relative increase in risk rating for TARP recipients, similar to the full sample result of 0.040. In column 6, the coefficient of −0.008 indicates a decrease of 0.008 in small TARP recipients' risk rating. The negative coefficient on TARP recipient for small banks is consistent with our previous result, but not significant. This may be due to the reduced sample size in the small bank matched sample.

5. Conclusion

The Treasury Asset Relief Program involved a major infusion of government funds into the banking system in an attempt to stabilize financial markets. The program was developed by congressional mandate; however, the purpose of the program was not entirely clear from the beginning. The program was originally portrayed as an effort to

reduce the risk profile of banks by increasing bank capitalization. In this respect, the program even involved requirements on executive compensation that were intended to reduce incentives for excessive risk-taking. However, the public response to the program also generated a significant push for banks to convert the funds into loan originations. Based on this purpose, banks were being encouraged to make more loans in an economic downturn which may have increased the degree of risk-taking through lending. The conflict between these two social objectives leads to conflicting predictions on the effect of TARP on bank risk-taking. In this paper, we examine the effect of TARP on bank risk-taking through commercial loan originations.

To test for changes in risk-taking at TARP banks, we create a panel data set of commercial loan originations that includes periods prior to the financial crisis as well as the TARP capital injection period. Using an event-study methodology, we first analyze the change in the average risk rating between the TARP and non-TARP banks by bank size. We then use loan-level regression analysis to test the hypothesis that the TARP capital injection lowered the risk rating of loan originations at TARP recipients.

The results from the event study illustrate that the average risk rating at large TARP recipients appears to have increased more than at large non-TARP recipients following the capital infusions. Conversely, the risk of loan originations by small TARP recipients appears to have decreased relative to non-TARP recipients. Although these results are not significant for the average time series, they are suggestive of a differential effect on risk-taking. In our regression results, we find consistent evidence that the TARP capital injection significantly increased the risky lending by the large banks receiving the funds and significantly decreased the risky lending by the small banks receiving the funds. These results are statistically significant after controlling for other bank and loan characteristics. Supporting evidence from interest spreads also indicates that the spreads on loans from large TARP recipients widened substantially following the TARP capital infusions.

Overall, we find that the degree of risk in commercial loans made by TARP recipients appears to have *increased* for large banks but *decreased* for small banks. These results suggest that the effect of TARP capital injections on bank risk-taking differed by bank size. One possible explanation for this finding is that TARP had two

conflicting social objectives which counteracted one another in their effect on bank risk-taking. In the effort to improve bank capitalization and safety and soundness, TARP may have reduced incentives to take on risk for small banks, yet, as a program implicitly expected to create additional lending, it may have increased incentives to take on risk for large banks. In addition, the use of government funds to support banks may have created incentives for excessive risk-taking through moral hazard. Given these conflicting objectives, it is not entirely surprising that TARP did not have a uniform effect on risk-taking.

In future research it would be interesting to explore whether credit smoothing by state-owned banks is welfare improving. Is it optimal or is it just a waste of resources? This would help in the evaluation of TARP as it relates to bank stability and bank lending.

References

Barrow, Janice M. and Paul M. Horvitz, 1993. Response of distressed firms to incentives: Thrift institution performance under the FSLIC management consignment program," *Financial Management* 22, 176-184.

Berger, Allen, Scott Frame, and Nathan Miller, 2005. "Credit scoring and the availability, price, and risk of small business credit," *Journal of Money, Credit, and Banking* 37, 191-122.

Campello, Murillo, 2002. "Internal capital markets in financial conglomerates: Evidence from small bank responses to monetary policy," *Journal of Finance* 57, 2773-2805.

Chari, V.V., Christiano, Lawrence J., and Kehoe, P atrick J., 2008. "Facts and myths about the financial crisis of 2008." Federal Reserve Bank of Minneapolis, Unpublished working paper.

Congressional Oversight Panel, 2009. "Accountability for the troubled asset relief program: The second report of the Congressional Oversight Panel," January 9, Washington, D.C.

DeYoung, Robert, Emma Peng and Meng Yan, 2009. "Executive compensation and business policy choices at U.S. commercial banks," Working paper, University of Kansas, KU School of Business.

Duchin, Ran and Denis Susyura, 2011. "Safer ratios, riskier portfolios: Banks' response to government aid," Working paper, University of Michigan.

Fahlenbrach, Rudiger, and Rene Stulz, 2009. "Bank CEO incentives and the credit crisis," Working paper, Ohio State University.

Gatev, Evan, and Philip Strahan, 2006. "Banks' advantage in hedging liquidity risk: Theory and evidence from the commercial paper market," *Journal of Finance* 61, 867-892.

Gonzalez, Francisco, 2005. "Bank regulation and risk-taking incentives: An international comparison of bank risk," *Journal of Banking & Finance* 29, 1153-1184

Hoshi, Takeo, and Kashyap, Anil, 2010. "Will the U.S. bank recapitalization succeed? Eight lessons from Japan," *Journal of Financial Economics* 97, 398-417.

Ivashina, Victoria and Scharfstein, David, 2010. "Bank lending during the financial crisis of 2008," *Journal of Financial Economics* 97, 319-338.

Jimenez, Gabriel, Lopez, Jose A., and Saurina, Jesus, 2007. "How does competition impact bank risk-taking?" Federal Reserve Bank of San Francisco Working Paper Series, 2007-23, September.

Jimenez, Gabriel, Lopez, Jose A., and Saurina, Jesus, 2009. "Calibrating exposure at default for corporate credit lines," Journal of Risk Management in Financial Institutions 2, 121-129.

Kashyap, Anil K., Rajan, Raguram G., Stein, Jeremy .C., 2002. "Banks as liquidity providers: an explanation for the co-existence of lending and deposit-taking." *Journal of Finance* 57, 33–73.

Micco, Alejandro and Panizza, Ugo, 2006. "Bank ownership and lending behavior" *Economic Letters* 93, 248-254.

Myers, Stewart C., 1977. "Determinants of corporate borrowing," *Journal of Financial Economics* 5, 147-175.

Ryan, Anthony W., 2008. Remarks at the SIFMA Annual Meeting. October 28. New York, New York.

Salas, Vicente and Saurina, Jesus, 2003. "Deregulation, market power and risk behavior in Spanish banks," *European Economic Review*, 47, 1061-1075

United States Department of the Treasury, 2008. Emergency Economic Stabilization Act of 2008. Washington, DC Government Printing Office.

Wilson, Linus and Wu, Wendy, 2010. "Common (stock) sense about risk-shifting and bank bailouts," *Financial Markets and Portfolio Management* 24, 3-29.

Figure 1: Total Amount of C&I Loans Outstanding during the Crisis

This figure shows aggregate commercial and industrial (C&I) loans from commercial banks in the U.S. from November 2007 to August 2010. The data are from the H.8 Statistical Release from the Board of Governors of the Federal Reserve System, which provides an estimated weekly aggregate balance sheet for all commercial banks in the United States. Each date is the weekly value of total non-seasonally adjusted C&I loans as of the week of the STBL survey. For example, November 2007 is the amount of C&I loans as of the week of November 7, 2007.

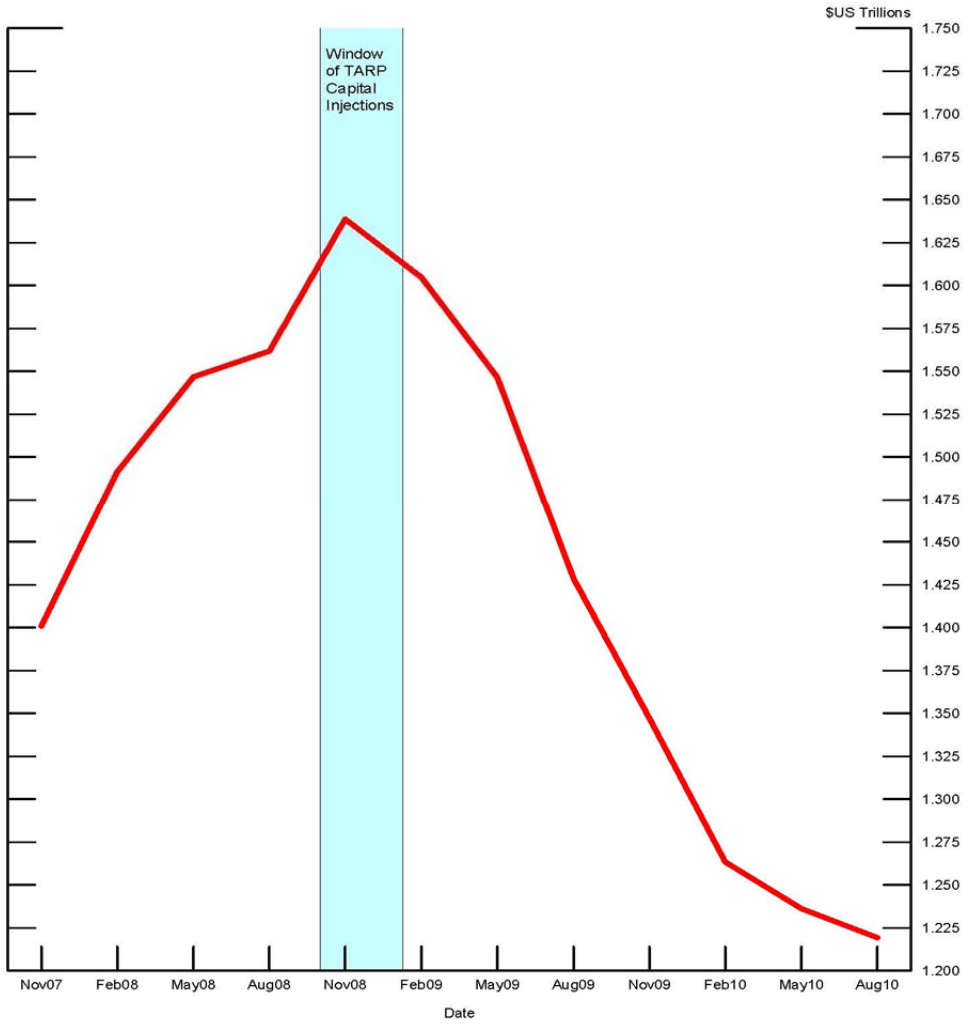

Figure 2: Risk Rating of Loan Originations by TARP and Non-TARP Banks

This figure shows the relative average risk of C&I lending across banks that received TARP capital infusions and banks that did not receive TARP capital infusions. The data are from the Survey of Terms of Business Lending, which records the risk rating of each loan that a bank makes during one week of each quarter. Risk ratings range from 1 (the safest) to 5 (the riskiest). The banks are stratified into three subsamples based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). Each average risk time-series is normalized to be zero at the time of the TARP capital infusions. The date of the TARP capital infusions for each size category is the relative time period for the non-TARP banks.

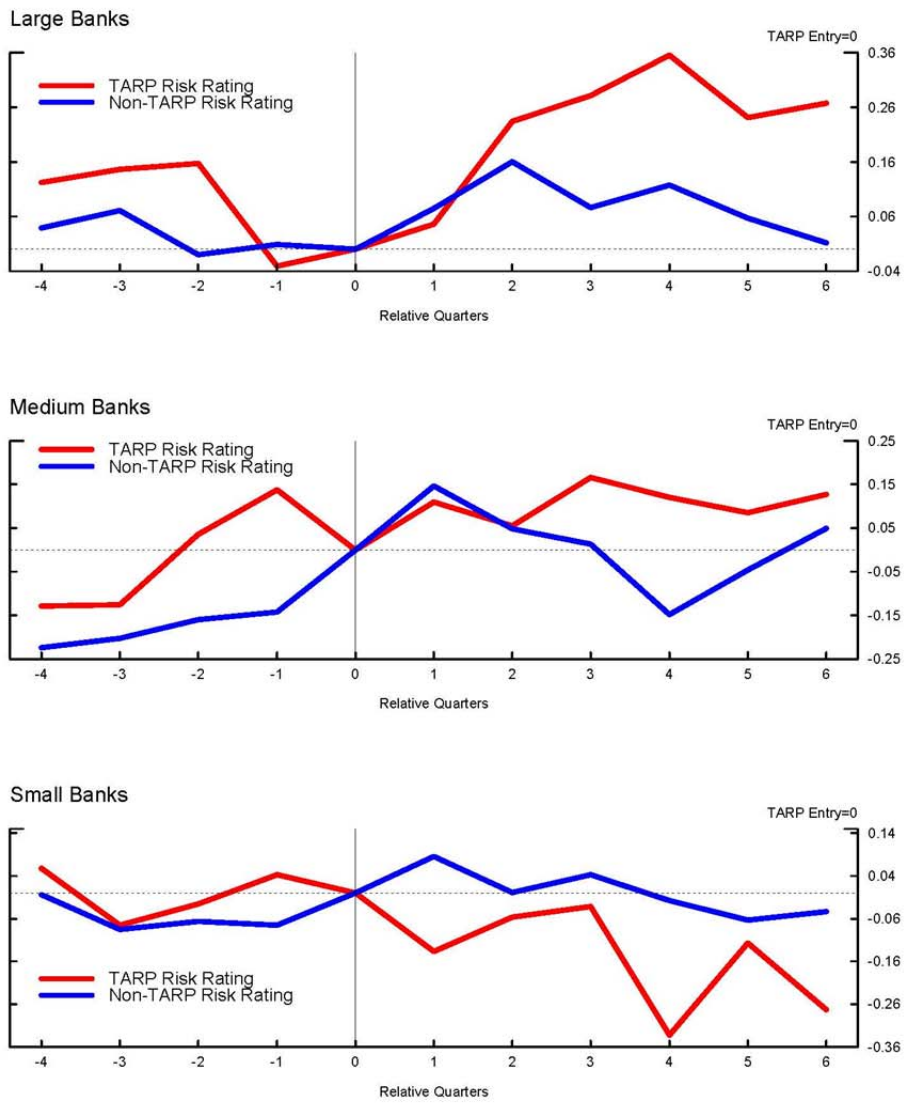

Figure 3: Interest Spread on Loan Originations by TARP and Non-TARP Banks

This figure shows the relative average interest spread on C&I loans made by banks that received TARP capital infusions and banks that did not receive TARP capital infusions. The data are from the Survey of Terms of Business Lending, which records the interest rate of each loan that a bank makes during one week of each quarter. The interest spread is in percentage points over prime. Each average interest spread time-series is normalized to be zero at the time of the TARP capital infusions. The date of the TARP capital infusions for each size category is the relative time period for the non-TARP banks.

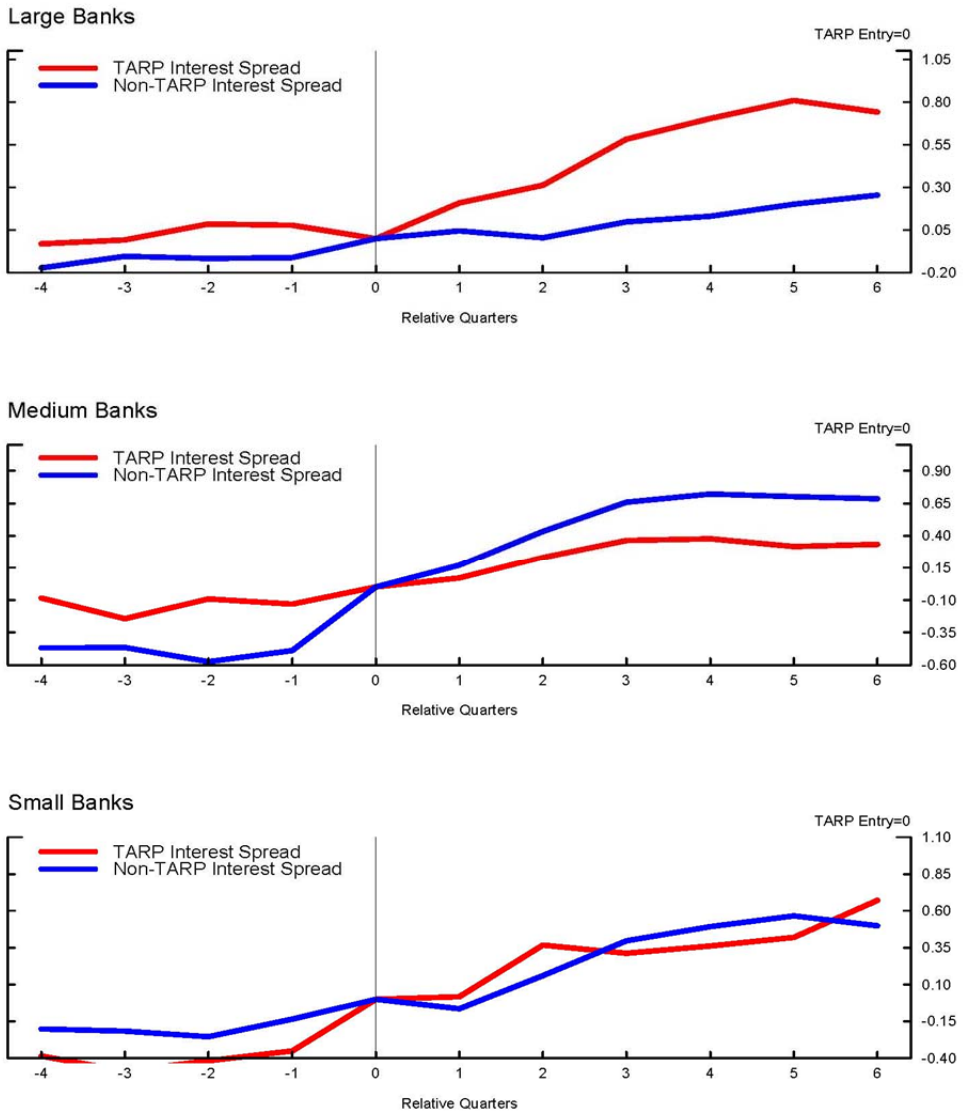

Figure 4: C&I Loans Outstanding by TARP and Non-TARP Banks

This figure shows commercial and industrial (C&I) loans from TARP and non-TARP banks from November 2007 to August 2010. The data are from the Call Report, which records a bank's C&I loans at the end of each quarter. The banks are stratified into three subsamples based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). Each time-series is the sum of C&I loans held by banks in that category normalized to be zero at the time of the TARP capital infusions. Only banks also appearing the STBL are included. The date of the TARP capital infusions for each size category is the relative time period for the non-TARP banks.

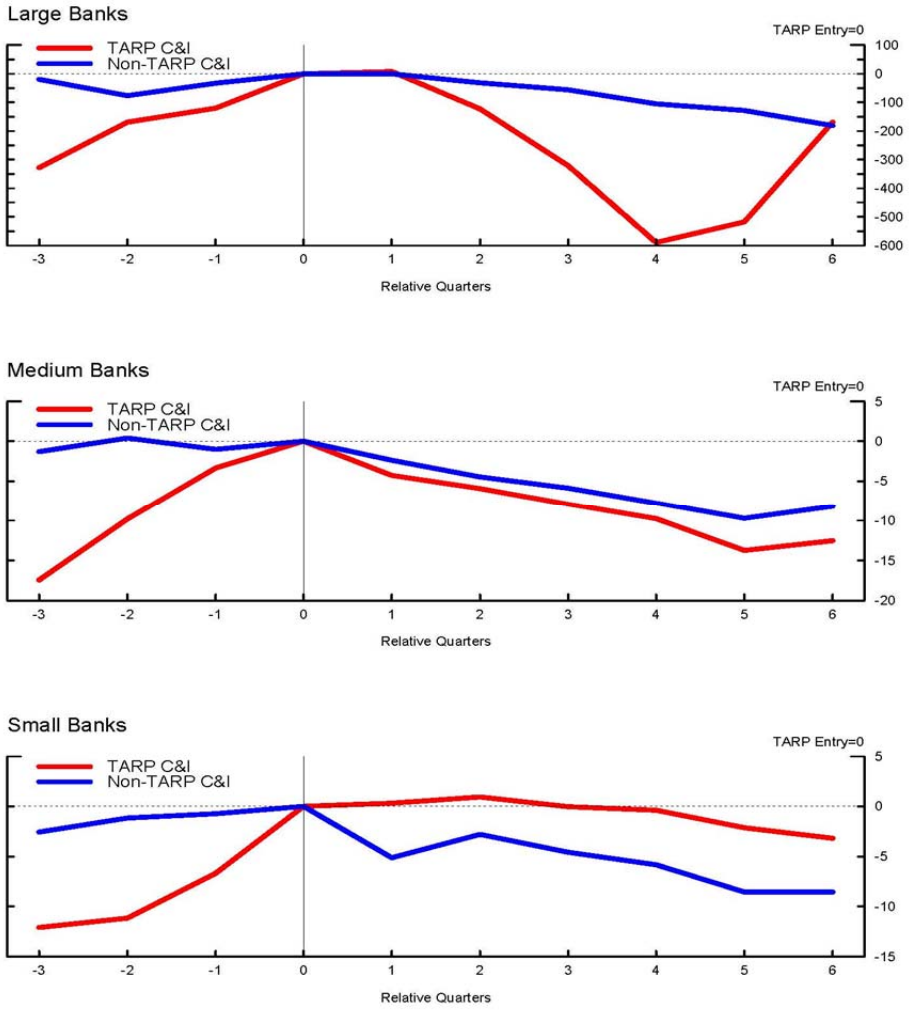

Table 1: Descriptive Statistics

This table shows the mean and standard deviation of several loan and bank characteristics. Each statistic is differentiated by the period before and after TARP and whether the bank was a recipient of TARP funds. Differences are then calculated across both dimensions. Differences-in-differences are shown in the bottom right corner. The t-tests indicate whether the means of the characteristics significantly differ along the dimension of comparison and standard deviations are shown in parentheses, with *, **, and *** indicating significance at 10%, 5%, and 1% respectively. The loan characteristics are from the Survey of Terms of Business Lending and the bank characteristics are from the Call Report. "Risk Rating" is the 1 to 5 risk rating on a loan, "Commitment" is a dummy variable indicating whether the loan was issued under an existing commitment, "Maturity" is the maturity of the loan in months, "Ln(Loan Size)" is the log of loan size in dollars, "Ln(Bank Size)" is the log of total assets, and "Capitalization" is bank equity/assets.

		(1)		(2)		(3)	
		Non-TARP Recipient		**TARP Recipient**		**TARP − Non-TARP**	
		Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
(1)	**Before TARP Period**						
	Loan Characteristics						
	Risk Rating	3.210	(0.833)	3.368	(0.842)	0.158***	(0.006)
	Interest	5.800	(1.454)	5.726	(1.388)	0.074***	(0.010)
	Commitment	0.788	(0.409)	0.932	(0.252)	-0.144***	(0.002)
	Maturity	11.270	(21.888)	11.989	(18.511)	0.719***	(0.137)
	Ln(Loan Size)	11.119	(1.479)	11.161	(1.540)	0.042***	(0.011)
	Secured	0.800	(0.400)	0.810	(0.392)	0.010***	(0.003)
	Floating	0.432	(0.495)	0.734	(0.442)	0.303***	(0.003)
	Bank Characteristics						
	Ln(Bank Size)	17.259	(1.601)	18.407	(1.662)	1.148***	(0.012)
	Capitalization	11.198	(2.966)	9.674	(1.583)	-1.524***	(0.015)
(2)	**After TARP Period**						
	Loan Characteristics						
	Risk Rating	3.230	(0.877)	3.462	(0.878)	0.232***	(0.005)
	Interest	3.786	(1.428)	3.876	(1.360)	0.090***	(0.008)
	Commitment	0.776	(0.417)	0.942	(0.234)	0.166***	(0.002)
	Maturity	9.078	(18.851)	10.647	(15.718)	1.569***	(0.092)
	Ln(Loan Size)	11.090	(1.480)	11.194	(1.528)	0.104***	(0.008)
	Secured	0.830	(0.376)	0.795	(0.404)	-0.035***	(0.002)
	Floating	0.415	(0.493)	0.745	(0.436)	0.330***	(0.002)
	Bank Characteristics						
	Ln(Bank Size)	17.543	(1.430)	18.728	(1.614)	1.185***	(0.009)
	Capitalization	11.863	(2.273)	9.524	(1.919)	-2.340***	(0.012)
(3)	**After − Before**						
	Loan Characteristics						
	Risk Rating	0.019***	(0.006)	0.094***	(0.004)	0.075***	(0.008)
	Interest	-2.014***	(0.011)	-1.850***	(0.007)	0.164***	(0.012)
	Commitment	-0.012***	(0.003)	0.010***	(0.001)	0.022***	(0.003)
	Maturity	-2.193***	(0.151)	-1.342***	(0.081)	0.851***	(0.159)
	Ln(Loan Size)	-0.029**	(0.011)	0.033**	(0.007)	0.062***	(0.014)
	Secured	0.030***	(0.003)	-0.015***	(0.002)	-0.045***	(0.004)
	Floating	-0.017***	(0.004)	0.011***	(0.002)	0.027***	(0.004)
	Bank Characteristics						
	Ln(Bank Size)	0.284***	(0.011)	0.321***	(0.008)	0.037***	(0.014)
	Capitalization	0.007***	(0.000)	-0.002***	(0.000)	0.008***	(0.000)
	Number of Banks	44		37			
	Number of Observations	75,052		182,975			

Table 2: Average Change in Risk of Loan Originations after TARP Injections

This table shows changes in the risk of loan originations by TARP and non-TARP banks as depicted in Figure 2. The amounts shown are the average change in risk ratings during the period following the TARP capital infusions. Risk ratings range from 1 (the safest) to 5 (the riskiest). The banks are stratified into three subsamples based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). Standard deviations are shown in parentheses, with *, **, and *** indicating significance at 10%, 5%, and 1% respectively.

	(1)		(2)		(3)	
	Non-TARP Recipient		**TARP Recipient**		**TARP − Non-TARP**	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
After TARP Period						
Large Banks						
Risk Rating	0.083***	(0.021)	0.238***	(0.042)	0.155***	(0.047)
Medium Banks						
Risk Rating	0.011	(0.041)	0.111***	(0.015)	0.100**	(0.044)
Small Banks						
Risk Rating	0.001	(0.023)	-0.158***	(0.049)	-0.159**	(0.054)

Table 3: Effect of TARP on Risk of Loan Originations

This table shows the results of loan-level regressions of loan risk on bank and loan characteristics. The dependent variable is the risk category of a loan in the Survey of Terms of Business Lending, which ranges from 1 (the safest) to 5 (the riskiest). The key explanatory variable is "TARP Recipient" which is a dummy variable with a value of one when a bank becomes a TARP recipient. The columns reflect the stratification of the data into three subsamples of banks based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). All regressions include bank and time fixed-effects. Robust standard errors are shown in brackets, with *, **, and *** indicating significance at 10%, 5%, and 1% respectively.

	Large Banks		**Medium Banks**		**Small Banks**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Bank Characteristics						
TARP Recipient	0.086	0.079	0.039	0.040	-0.060	-0.087
	[0.000]***	[0.000]***	[0.017]**	[0.014]**	[0.065]*	[0.008]***
Ln(Bank Size)	0.046	0.049	-0.097	-0.113	-0.087	-0.058
	[0.001]***	[0.000]***	[0.079]*	[0.040]**	[0.176]	[0.356]
Capitalization	0.008	0.006	0.031	0.031	-0.001	-0.004
	[0.001]***	[0.006]***	[0.000]***	[0.000]***	[0.923]	[0.483]
Loan Characteristics						
Commitment		0.233		0.019		0.020
		[0.000]***		[0.583]		[0.544]
Maturity		-0.002		-0.001		0.000
		[0.000]***		[0.000]***		[0.580]
Ln(Loan Size)		-0.024		-0.041		-0.007
		[0.000]***		[0.000]***		[0.240]
Secured		0.112		0.197		0.215
		[0.000]***		[0.000]***		[0.000]***
Floating		0.105		0.005		0.241
		[0.000]***		[0.752]		[0.000]***
Bank Fixed Effects	Y	Y	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y	Y	Y
Number of Observations	212636	212636	33524	33524	11867	11867
Adjusted R-Squared	0.200	0.211	0.238	0.247	0.315	0.330

Table 4: Effect of TARP on Risk of Loan Originations (Ordered Logit)

This table shows the results of loan-level regressions of loan risk on bank and loan characteristics using an ordered logit specification. The dependent variable is the risk category of a loan in the Survey of Terms of Business Lending, which ranges from 1 (the safest) to 5 (the riskiest). The key explanatory variable is "TARP Recipient" which is a dummy variable with a value of one when a bank becomes a TARP recipient. The columns reflect the stratification of the data into three subsamples of banks based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). All regressions include time fixed-effects. Instead of presenting the logit coefficients, we report odds ratios which are obtained by exponentiating the original coefficients. Robust standard errors are shown in brackets, with *, **, and *** indicating significance at 10%, 5%, and 1% respectively.

	Large Banks		**Medium Banks**		**Small Banks**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Bank Characteristics						
TARP Recipient	1.545	1.329	0.623	0.649	0.318	0.307
	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Ln(Bank Size)	1.133	1.035	0.476	0.816	3.018	2.836
	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Capitalization	0.990	1.000	1.145	1.096	0.898	0.920
	[0.000]***	[0.943]	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Loan Characteristics						
Commitment		2.995		0.261		1.084
		[0.000]***		[0.000]***		[0.070]*
Maturity		1.001		0.991		0.998
		[0.011]**		[0.000]***		[0.005]***
Ln(Loan Size)		0.930		0.870		0.984
		[0.000]***		[0.000]***		[0.243]
Secured		1.412		1.975		1.974
		[0.000]***		[0.000]***		[0.000]***
Floating		1.519		2.447		1.007
		[0.000]***		[0.000]***		[0.856]
Time Fixed Effects	Y	Y	Y	Y	Y	Y
Number of Observations	212636	212636	33524	33524	11867	11867
Pseudo R-Squared	0.009	0.031	0.023	0.045	0.023	0.031

Table 5: Effect of TARP on Interest Spread for Loan Originations

This table shows the results of loan-level regressions of loan interest spreads on bank and loan characteristics. The dependent variable is the interest spread of a loan in the Survey of Terms of Business Lending, which is the percentage point spread over the bank's prime rate. The key explanatory variable is "TARP Recipient" which is a dummy variable with a value of one when a bank becomes a TARP recipient. The columns reflect the stratification of the data into three subsamples of banks based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). All regressions include bank and time fixed-effects. Robust standard errors are shown in brackets, with *, **, and *** indicating significance at 10%, 5%, and 1% respectively.

	Large Banks		**Medium Banks**		**Small Banks**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Bank Characteristics						
TARP Recipient	0.544	0.521	-0.094	-0.108	-0.042	-0.058
	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.430]	[0.270]
Ln(Bank Size)	0.367	0.376	0.872	0.935	0.726	0.776
	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Capitalization	0.064	0.061	0.014	0.004	-0.029	-0.035
	[0.000]***	[0.000]***	[0.023]**	[0.425]	[0.003]***	[0.000]***
Loan Characteristics						
Risk Rating		0.289		0.280		0.168
		[0.000]***		[0.000]***		[0.000]***
Commitment		-0.523		-0.702		-0.083
		[0.000]***		[0.000]***		[0.255]
Maturity		0.008		0.003		0.004
		[0.000]***		[0.000]***		[0.000]***
Ln(Loan Size)		-0.138		-0.098		-0.145
		[0.000]***		[0.000]***		[0.000]***
Secured		-0.184		0.037		0.164
		[0.000]***		[0.071]*		[0.000]***
Floating		-0.113		0.067		0.098
		[0.000]***		[0.008]***		[0.035]**
Bank Fixed Effects	Y	Y	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y	Y	Y
Number of Observations	137674	137674	25867	25867	8682	8682
Adjusted R-Squared	0.187	0.268	0.267	0.328	0.356	0.390

Table 6: Dollar Amount of TARP Infusion and Risk of Loan Originations

This table shows the results of loan-level regressions of loan risk on bank and loan characteristics. The dependent variable is the risk category of a loan in the Survey of Terms of Business Lending, which ranges from 1 (the safest) to 5 (the riskiest). The key explanatory variable is "Ln(TARP dollar amount)," which is the log of the dollar amount of the capital infusion. The columns reflect the stratification of the data into three subsamples of banks based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). All regressions include bank and time fixed-effects. Robust standard errors are shown in brackets, with *, **, and *** indicating significance at 10%, 5%, and 1% respectively.

	Large Banks		**Medium Banks**		**Small Banks**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Bank Characteristics						
Ln(TARP dollar amount)	0.005	0.004	0.002	0.003	-0.002	-0.003
	[0.000]***	[0.000]***	[0.007]***	[0.004]***	[0.241]	[0.098]*
Ln(Bank Size)	0.047	0.049	-0.107	-0.125	-0.106	-0.088
	[0.001]***	[0.000]***	[0.052]*	[0.022]**	[0.112]	[0.181]
Capitalization	0.007	0.006	0.031	0.030	0.000	-0.003
	[0.001]***	[0.009]***	[0.000]***	[0.000]***	[0.996]	[0.578]
Loan Characteristics						
Commitment		0.233		0.020		0.021
		[0.000]***		[0.576]		[0.521]
Maturity		-0.002		-0.001		0.000
		[0.000]***		[0.000]***		[0.567]
Ln(Loan Size)		-0.024		-0.041		-0.007
		[0.000]***		[0.000]***		[0.230]
Secured		0.112		0.197		0.214
		[0.000]***		[0.000]***		[0.000]***
Floating		0.105		0.005		0.239
		[0.000]***		[0.777]		[0.000]***
Bank Fixed Effects	Y	Y	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y	Y	Y
Number of Observations	212636	212636	33524	33524	11867	11867
Adjusted R-Squared	0.200	0.212	0.238	0.247	0.315	0.330

Table 7: Dollar Amount of TARP Infusion and Risk of Loan Originations (Ordered Logit)

This table shows the results of loan-level regressions of loan risk on bank and loan characteristics using an ordered logit specification. The dependent variable is the risk category of a loan in the Survey of Terms of Business Lending, which ranges from 1 (the safest) to 5 (the riskiest). The key explanatory variable is "Ln(TARP dollar amount)," which is the log of the dollar amount of the capital infusion. The columns reflect the stratification of the data into three subsamples of banks based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). All regressions include bank and time fixed-effects. Instead of presenting the logit coefficients, we report odds ratios which are obtained by exponentiating the original coefficients. Robust standard errors are shown in brackets, with *, **, and *** indicating significance at 10%, 5%, and 1% respectively.

	Large Banks		**Medium Banks**		**Small Banks**	
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Bank Characteristics						
Ln(TARP dollar amount)	1.023	1.015	0.974	0.976	0.942	0.940
	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Ln(Bank Size)	1.120	1.029	0.483	0.834	3.173	3.001
	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Capitalization	0.996	1.004	1.149	1.099	0.899	0.922
	[0.074]*	[0.078]*	[0.000]***	[0.000]***	[0.000]***	[0.000]***
Loan Characteristics						
Commitment		2.981		0.261		1.091
		[0.000]***		[0.000]***		[0.050]**
Maturity		1.001		0.991		0.998
		[0.006]***		[0.000]***		[0.003]***
Ln(Loan Size)		0.930		0.870		0.982
		[0.000]***		[0.000]***		[0.190]
Secured		1.411		1.978		1.981
		[0.000]***		[0.000]***		[0.000]***
Floating		1.506		2.455		1.005
		[0.000]***		[0.000]***		[0.893]
Time Fixed Effects	Y	Y	Y	Y	Y	Y
Number of Observations	212636	212636	33524	33524	11867	11867
Pseudo R-Squared	0.010	0.031	0.023	0.047	0.022	0.030

Table 8: Effect of TARP on Risk of Loan Originations using a Matched Pair Sample

This table shows the results of loan-level regressions of loan risk on bank and loan characteristics using a matched pair sample. The dependent variable is the risk category of a loan in the Survey of Terms of Business Lending, which ranges from 1 (the safest) to 5 (the riskiest). The key explanatory variable is "TARP Recipient" which is a dummy variable with a value of one when a bank becomes a TARP recipient. The columns reflect the stratification of the data into three subsamples of banks based on their size: large (total assets > $10 Billion), medium ($10 Billion ≥ total assets > $1 Billion), and small (total assets < $1 Billion). All regressions include bank and time fixed-effects. Robust standard errors are shown in brackets, with *, **, and *** indicating significance at 10%, 5%, and 1% respectively.

	Large Banks		Medium Banks		Small Banks	
	(1)	(2)	(3)	(4)	(5)	(6)
Bank Characteristics						
TARP Recipient	0.097	0.091	0.056	0.055	0.014	-0.008
	[0.000]***	[0.000]***	[0.002]***	[0.003]***	[0.724]	[0.843]
Ln(Bank Size)	0.059	0.062	-0.184	-0.202	-0.156	-0.135
	[0.000]***	[0.000]***	[0.002]***	[0.001]***	[0.053]*	[0.089]*
Capitalization	0.003	0.001	0.028	0.027	0.014	0.008
	[0.209]	[0.573]	[0.000]***	[0.000]***	[0.211]	[0.470]
Loan Characteristics						
Commitment		0.162		-0.022		0.06
		[0.000]***		[0.581]		[0.258]
Maturity		-0.002		-0.001		0
		[0.000]***		[0.000]***		[0.412]
Ln(Loan Size)		-0.017		-0.04		0.003
		[0.000]***		[0.000]***		[0.688]
Secured		0.119		0.194		0.256
		[0.000]***		[0.000]***		[0.000]***
Floating		0.111		0.03		0.161
		[0.000]***		[0.135]		[0.000]***
Bank Fixed Effects	Y	Y	Y	Y	Y	Y
Time Fixed Effects	Y	Y	Y	Y	Y	Y
Number of Observations	192510	192510	30255	30255	6524	6524
Adjusted R-Squared	0.206	0.215	0.233	0.242	0.3	0.311