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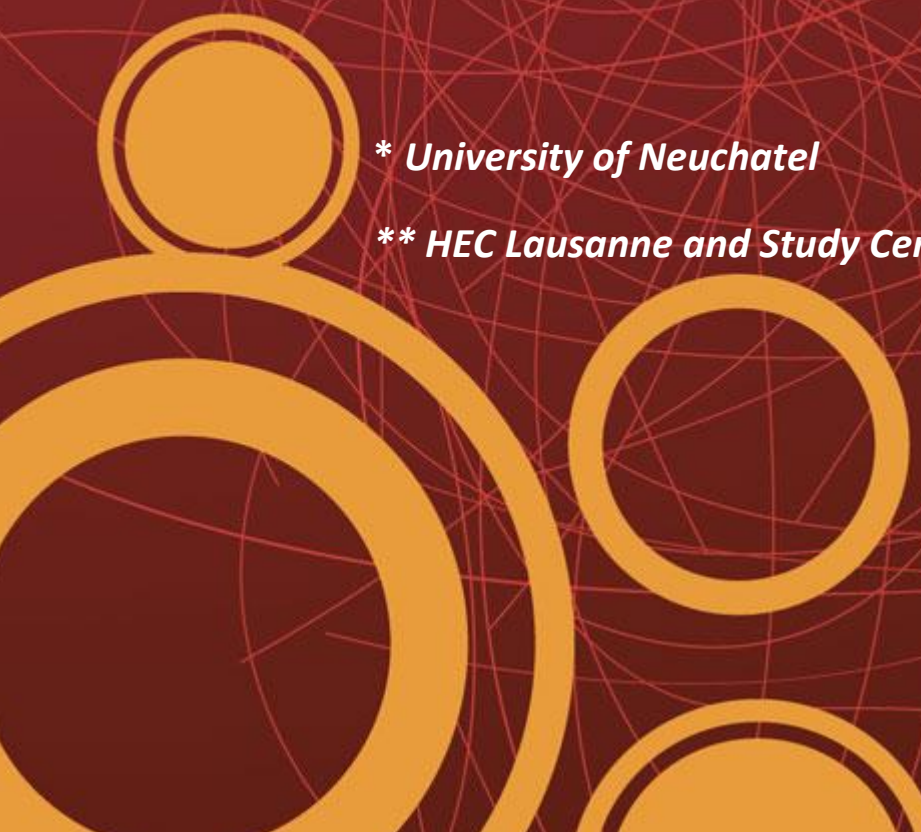


TARP Effect on Bank Lending Behaviour: Evidence from the last Financial Crisis

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TARP Effect on Bank Lending Behaviour: Evidence from the last Financial Crisis.*

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Abstract

Using a unique data set based on US commercial banks and county level loan origination for the period 2005–2010, we measure whether banks that benefited from the Troubled Asset Relief Program (TARP) increase small business loan originations. We propose an identification strategy which exploits the ownership structure of bank holding companies. We find that TARP banks provide on average 19% higher small business loan originations than NO TARP banks. The disaggregated data allows us to control for the potential demand side effects. When considering poverty and unemployment rates at a county level we show that TARP is effective only in counties suffering from unemployment. Several robustness checks confirm the main result.

Keywords TARP, Financial Crisis, Loan provision

JEL Classification C23, E58, G21, G28

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1 Introduction

“TARP was an abysmal failure on those very important goals the reason why they got that money to give to the banks in the first place...” Neil M. Barofsky, Former TARP Inspector General.

“If the alternative was indeed the abyss, TARP was clearly an unqualified success: we have escaped the abyss.” Luigi Zingales, March 4, 2011.

The two opposing views on TARP summarise the ambiguity and disagreement in judging the results of the largest rescue plan ever promoted by the US Treasury. This asymmetry in assessing the success of TARP is partially due to the conflicting goals of the program. Through TARP, the US Treasury intended to help banks to improve their balance sheets and therefore to increase the robustness of the financial system. Furthermore, banks that benefited from TARP were asked to keep providing credit to firms, small businesses and households. Potentially, the two goals are in conflict: if banks keep on providing loans to distressed and insolvent businesses, this might further weaken the banking system. The current debate on the TARP program discusses the potential cost for the US taxpayer, but there is no consensus on the results. Veronesi and Zingales (2010) find that TARP increased the value of banks’ financial claims by \$130 billion. However, the majority of the gain went to bank bondholders while the cost was incurred by the US taxpayers. By contrast, the Treasury Secretary, Timothy Geithner, stresses that “...taxpayers are likely to receive an impressive return (totalling tens of billions) on the investments made under the TARP outside the housing market.”¹.

The main driver of TARP was to soften the credit crunch, in particular to small businesses. Yet, the literature so far has not discussed the effect of the TARP program on bank lending to small businesses. We focus our attention to small businesses because of its relative importance to the US economy. According to a report of the US Small Business Administration (Kobe, 2012), in 2008 small businesses (businesses with less than 500 employees) account for 46 percent of total non-farm GDP and about 50 percent in total non-farm employment. Moreover, as claimed by Berger and Udell (2002) “Small firms are

¹Timothy Geithner, The Washington Post, 10.10.2010.

[...] vulnerable because of their dependence on financial institutions for external funding. These firms simply do not have access to public capital markets.” This is confirmed from data collected by the The Federal Reserve Board (2003), where 87 percent of small firms report that their lender is a bank.

In this paper we fill the gap in the literature by analysing TARP bank features and assessing the impact of the TARP program on small business loan originations. We meet our goal by creating a unique data set based on bank balance sheets, TARP program participation, small business loan originations and county socio-economic features. More precisely, the bank balance sheet data were obtained from the Call reports. The information about TARP program participation was downloaded from the US Treasury, while the data covering small business loan originations comes from the Community Reinvestment Act (CRA) data set and was retrieved through the Federal Financial Institutions Examination Council (FFIEC) website. Finally, the county socio-economic features were downloaded from the US Census Bureau and the Bureau of Labor Statistics. The period under examination goes from 2005 to 2010, and data are per annum. We distinguish banks depending on their participation in the TARP program.

Comparing the groups of banks in 2005, TARP banks provide on average larger amounts of loan origination to small businesses, exhibit lower levels of capital buffer and they are less exposed to non performing loans than the rest of the banks. Finally, TARP banks are more likely to provide loans in counties that suffer from higher poverty and unemployment levels. In 2010, once the program is over, TARP banks still provide more new loans, and they are more likely to be located in counties with poverty and unemployment problems, but they also show a higher level of capital buffer and higher exposure to non performing loans than the rest of the banks. These differences may shed light on how banks employed TARP financial support apart from continuing to finance small businesses: increasing their buffer, lending to lower quality borrowers, or revealing the true quality of existing assets.

TARP participation was not random: banks decide whether to apply for TARP. This

feature, if not properly treated, might lead to biased results. In order to address this issue, we exploit the ownership structure of bank holding companies (BHC). In particular, we focus on BHCs that received TARP and that control more than one bank. We assume that TARP participation for a BHC is not driven by the average financial strength (which we measure by the capital ratio) of all subsidiary banks, but by the banks in distress (banks with low capital ratios). Within a BHC, to banks with high capital ratios, TARP participation can thus be considered exogenous. In other words, if these banks were alone in the market, they were not likely to go for TARP. Using the above identification strategy, we show that the results are not driven by the selection issue. Moreover, TARP banks increase small business loan originations compared to the rest of the banks. This effect is statistically as well as economically significant: a TARP bank increases small business loan origination by about 19% in the years after receiving TARP equity.

Once we have established that TARP banks provide more loans compared to the rest of banks, we must make sure that this effect is a credit crunch, and not just the result of lower demand for credit. Here lies our second main contribution: the data set we use provides information on loan originations for each bank within each county. This within-county variation of TARP and NO TARP banks allows us to control for the fact that TARP banks might be located in sounder counties, with a high demand for loans. This is achieved by including bank-county fixed effects in the specifications.

We are also able to characterise which variables determine the effectiveness of TARP on a local level. To the baseline model we add measures of poverty and unemployment in each county. Poverty captures persistent economic problems, while unemployment reflects more temporary economic issues, because it is strongly related with the business cycle. The results highlight that higher levels of unemployment and poverty decrease loan provision. We find that TARP has a positive and statistically significant effect on small business loan originations only in counties suffering from high unemployment.

Our study contributes to a small but increasing literature on the effects of the TARP program. Taliaferro (2009) finds that TARP banks exhibit higher commitments (i.e.,

opportunities for new lending), are more exposed to troubled loan classes and show higher leverage and expected costs of regulatory downgrades. Moreover, he finds that for each dollar of new government equity provided through the TARP, on average thirteen cents are employed to expand loans and sixty cents are used to increase capital ratios. These results are partially in line with those of Li (2011). On the one hand, by focusing on banks with Tier 1 capital ratios below the median, Li finds that TARP financial support helped banks in increasing loan supply by an annualized rate of 6.43%. This increase in loan supply was not to the detriment of the quality of the loans. On the other hand, Li shows that for each dollar provided to the banks through the TARP program one-third was used to finance new loans, and two-third to restructure their balance sheets. Black and Hazelwood (2012) assess the effect of the TARP program on bank risk-taking behaviour. Specifically, they focus on the risk rating of banks' commercial loans. They find that TARP financial support increases risk taking behaviour for big banks while the relation goes in the opposite direction in the case of small banks. These findings are confirmed when spreads instead of risk ratings are employed.

Other contributions focus on the determinants of TARP participation as in Bayazitova and Shivdasani (2012); the relevance of the political connection in the likelihood of obtaining the financial support as documented by Duchin and Sosyura (2012); the reaction of the stock market to bank participation in the TARP program as in Ng et al. (2011); the effective cost of the TARP program as analysed by Veronesi and Zingales (2010); and finally on the key features explaining early exit from the TARP program as discussed by Wilson and Wu (2012).

The paper serves as an empirical test of the macro models which feature a 'financial accelerator'. Models like Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) and others focus on credit constraints faced by non-financial borrowers. The recent financial crisis though showed that there were substantial disruptions in the financial intermediation process. Gertler and Kiyotaki (2010) therefore propose a model with an agency problem that potentially constrains the ability of intermediaries to raise funds from depositors.

When the constraint is binding, the intermediary’s balance sheet limits its ability to obtain deposits. In times of crisis, the model predicts a significant increase of the cost of credit that non-financial borrowers face. The model by Gertler and Kiyotaki (2010) predicts that government equity injection relieves the intermediary’s borrowing constraint and thus increases credit to, and production by the non-financial sector.

The most important innovations of this paper are the data set and the way of addressing program participation. This is the first study to exploit the CRA data set, allowing us to focus on small business loan originations, which represents, as previously mentioned, a relevant fraction of the US economy. We provide a new approach to address the selection bias issue related to the voluntary participation in the TARP program. In particular, we exploit the relationship between BHCs and controlled commercial banks (we focus on BHCs with more than one controlled commercial bank, having received TARP financial support) to construct an exogenous TARP bank group.

2 TARP and Community Reinvestment Act

2.1 Troubled Asset Relief Program

The Troubled Asset Relief Program (TARP) was launched by the US Treasury in 2008 after the collapse of Lehman Brothers. TARP is the largest program ever promoted by the US Government with \$700 billion available funds, and \$420 billion effectively used. TARP consists of Bank Support Programs (\$250.46 billion), Credit Market Programs (\$26.52 billion), Housing Programs (\$45.60 billion) and other programs for AIG and the automobile sector (\$147.53 billion). The programs of interest are the Bank Support Programs, which can be divided into the Target Investment Program, which exclusively addressed Citigroup and the Bank of America, the Capital Purchase Program (CPP), and the Community Development Capital Initiative (CDCI). Our analysis focuses on the CPP.

The CPP is a voluntary program directed to financial institutions in a broad sense.

The program was created in October 2008. The amount of capital provided through this program was about \$205 billion. 707 institutions benefited from the program funds. The CPP mechanism to inject capital was based on purchases of senior preferred stock and warrants exercisable for common stock with a promised dividend of 5% for the first 5 years and 9% thereafter. Under the CPP, institutions could receive an amount between 1% and 3% of their risk-weighted assets. The aims of the CPP were to provide the financial institution with capital, to restore confidence in the banking sector, and to support financial institutions to keep financing firms, small businesses and households. Only solvent institutions were eligible for CPP.

2.2 Community Reinvestment Act

Data about small business loan originations is from the Community Reinvestment Act (CRA) data set. The Federal Financial Institutions Examination Council (FFIEC) collects information about bank loan activity as well as features and characteristics of borrowers. According to the CRA, all insured institutions that exceed specific total asset thresholds, defined by the federal bank regulatory agencies, must be periodically evaluated in their activity of helping meet the credit needs of the areas where they are located. This evaluation is used in case an institution applies for deposit facilities, or in case of mergers and acquisitions.²

The Community Reinvesting Act was approved by the US Congress in 1977 with the aim “to encourage depository institutions to help meet the credit needs of the communities in which they operate, including low- and moderate-income neighbourhoods, consistent with safe and sound operations”³. The law was introduced to counteract discriminatory loan practices, commonly referred to as “redlining”, where loan providers used to mark the borders of specific areas they did not intend to serve with any type of loans in red

²The Office of the Comptroller of the Currency, the Federal Reserve System, the Federal Deposit Insurance Corporation, and the Office of Thrift Supervision are the federal bank regulatory agencies which define the total asset threshold. Further information about the CRA examinations is available at <http://www.ffiec.gov/cra/history.htm>

³<http://www.bos.frb.org/commdev/regulatory-resources/cra/cra.pdf>

(see for instance Figure 3 in the Appendix).

3 Data and Descriptive Analysis

3.1 Data set

The data set we employ is the result of a merging process. Data concerning financial institution balance sheets⁴ is obtained from the Report of Condition and Income (generally referred to as Call Reports). We access the Call Report data through the Federal Reserve of Chicago website. The frequency of the data is quarterly. The period considered goes from 2005:Q1 to 2010:Q4.

Data on TARP is publicly available on the website of the US Treasury. We consider the period from the end of October 2008, when the TARP program started operating, to April 2012, when the majority of the banks returned their preferred stock obligations or they bought back their warrants owned by the US Treasury.

We obtain information on bank loan originations at county level from the FFIEC website and the poverty and unemployment rates are from the US Census Bureau and the Bureau of Labor Statistics. Data are recorded yearly and the period considered goes from 2005 to 2010. We list the sources also in Table 11 of the Appendix.

3.2 Combining Call Reports, TARP and CRA data sets

We focus on annual data, because the variable of interest (loan originations) are only available at a yearly frequency. For quarterly data we measure the series in the fourth quarter of each year. The sample period goes from 2005 to 2010. We drop the nine banks that were forced to participate in TARP; these institutions are Citigroup, Wells Fargo, JPMorgan, Bank of America, Goldman Sachs, Morgan Stanley, State Street, Bank of New York Mellon, and Merrill Lynch. There are two types of institutions that benefited

⁴Call Report data suffer from the so-called “window dressing” effect. Specifically, the day before the report, banks adopt a virtuous behaviour so that their balance sheets look particularly good on the day of the report. Unfortunately, we cannot control for this issue.

from the TARP program: individual banks and Bank Holding Companies (BHC). As our analysis is led at the bank level, we map each commercial bank with its BHC. Therefore, for each depository institution included in our final data set, we can assess whether it benefited (directly or indirectly) from TARP. From the original Call Report data set, we drop all foreign banking organizations (FBOs) and banks that report capital ratios smaller than 0%, since these banks were not eligible for TARP.

After the above-mentioned merging and filtering procedures, in 2005, the final data set contains 794 banks, and of those 213 received financial support through the TARP program. Overall, banks provide loans in 2634 counties, while the TARP banks provide loans in 2026 counties. In 2010, the data set contains 635 banks that provide loans in 2650 counties. Of these banks 255 received the TARP financial support and they provide loans in 2113 counties. Our data set includes around 10 percent of institutions that hand in Call Reports, and around 50 percent of all TARP banks. The data set is a panel of banks tracked for five years.

3.3 Description of variables

The baseline measure of small business loan originations is *LOANS* 0. It is defined as the log of one plus the sum of total loan origination. Small business loan originations can be classified by size. We define *LOANS* 1 (loan size between \$0 and \$100k), *LOANS* 2 (loan size between \$100k and \$250k) and *LOANS* 3 (loan size between \$250k and \$1m) as the log of one plus small business loan originations of the respective size. These variables are on a bank-county level.

The majority of the variables included in our data set are bank-specific. *TOTLOANS* is the ratio of total loans over total assets. *RELOANS* is the ratio of real estate loans over total loans. *SIZE* is the log of one plus the total assets of the banks (both on and off balance sheet items), while *NPL* is defined as the ratio of non-performing loans over total loans. *CAPRATIO* is defined as Tier 1 (core) capital divided by adjusted total assets. Following Gozzi and Goetz (2010), we also include *TOT UNCOMM* and *NOCORE*

PA. These variables are defined as the fraction of total unused loan commitments over total assets (on and off balance sheet items) and as the sum of total time deposits of at least \$100k, foreign office deposits, insured brokered deposits issued in denominations of less than \$100k, securities sold under agreements to repurchase, federal funds purchased, and other borrowed money over total assets.

We also consider a set of variables that refer to the socio-economic features of the counties included in the CRA data set. In particular, we obtained the series on poverty, county median income and unemployment from the US Census Bureau and the Bureau of Labour Statistics. More precisely, *POVERTY* is defined as the estimated percentage of people of all ages in poverty; *MED_INC* is the estimated of median household income, while *UNEMPLOYMENT* is defined as the ratio of people who do not have a job, have actively looked for work in the prior 4 weeks, and are currently available for work over total labour force⁵. A detailed list of the original names of the series employed in this paper, definitions and labels is provided in Table 11 in the Appendix.

3.4 Main facts

3.4.1 Descriptive statistics

In Table 2, for each of the variables, we report the number of observations, banks and counties when this is feasible, the mean, the standard deviation, and the 10th, 50th and the 90th percentiles. All variables are measured in 2005. The analysis of the different loan variables is on a bank-county basis, whereas the rest of the variables are on a bank basis. Focusing on the loan variables, from Table 2, it follows that on average *LOANS* 2 are lower than the other two loan types. Moreover, *LOANS* 0 show the lowest level of dispersion around the average, and finally, the 10th percentile of bank-pairs of *LOANS* 2 and *LOANS* 3 are zero, indicating that banks focus more on small size loans.

⁵See <http://www.census.gov/did/www/saipe/> and <http://www.bls.gov/cps/tables.htm> for more information.

3.4.2 Unconditional average differences

We divide the banks in two groups (TARP and NO TARP) depending on whether they participated in TARP and define BEFORE (2005) and AFTER (2010) periods. Then, we test whether the unconditional averages differ across groups and across periods. We run the following regression, excluding any additional explanatory variables:

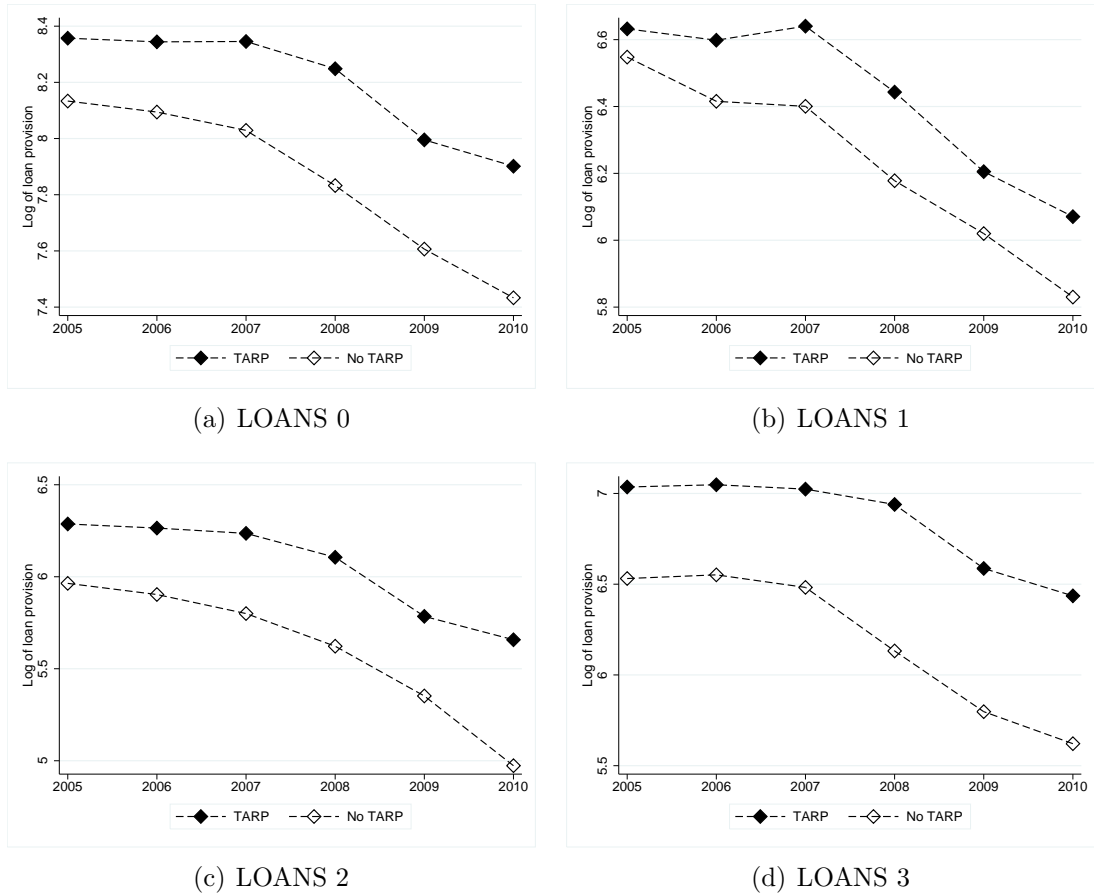
$$Y_{s,t} = \alpha + \beta_1 time_t + \beta_2 TARP_s + \beta_3 TARP_s \times time_t + \epsilon_{s,t} \quad (1)$$

In Equation (1) the variable of interest, $Y_{s,t}$, is regressed on a constant, a *time* dummy variable that captures the time dimension (*time* takes value one in the AFTER period, zero otherwise); a *TARP* dummy variable (*TARP* takes value one if a bank participate in TARP, zero otherwise) and an interactive dummy variable, $TARP \times time$, capturing the difference-in- difference. Table A in the Appendix provides a quick view of the possible combinations.

We are interested in testing average differences within groups across time and within time across groups. When fixing the bank group (TARP or NO TARP), we assess whether there are on average differences within the group and across periods. Instead, when fixing the time dimension (AFTER or BEFORE) we test whether there are on average differences across groups and within periods. Finally, taking the difference-in-difference, we assess whether there are statistical significant differences across groups and across periods. As can be seen in Table A, this effect is captured by β_3 . The results are reported in the Appendix. It turns out that TARP banks provide more new loans. This is always true, regardless of the period (columns 1 and 2), and the type of loans. Moreover, both groups of banks decrease their loan provision between 2005 and 2010, but TARP banks less than NO TARP banks (columns 3 and 4). As a consequence, the difference-in-difference is positive and statistically significant for all loan types (column 5). The second finding refers to the level of *CAPRATIO*: in 2005 (column 1), TARP banks show lower level of capital buffer compared to the rest of the bank. All banks, over time, increase their

capital buffer but TARP banks more than NO TARP banks (columns 3 and 4). The difference-in-difference is positive and statistically significant (column 5). Finally, looking at non-performing loans, the results highlight that in 2005 TARP banks show a lower level of non-performing loans compared to the rest of the banks (column 1). Over time, both groups of banks are subject to higher non-performing loans, but TARP banks experience a higher expansion (columns 3 and 4). It follows that the difference of the difference is positive and statistically significant (column 5). From the previous analysis we can infer three main conclusions: the TARP program alleviates the drop in loans; TARP banks use the financial support, at least partially, to increase their capital buffer; the quality of TARP bank borrowers decreases over time faster than that of the rest of the banks.

Figure 1: Per-quarter-group, averages



Notes: Per-quarter average small business loan originations for TARP and NO TARP banks. Aggregation by giving each bank-county observation the same weight.

The results from the unconditional averages tests are confirmed by a visual counterpart

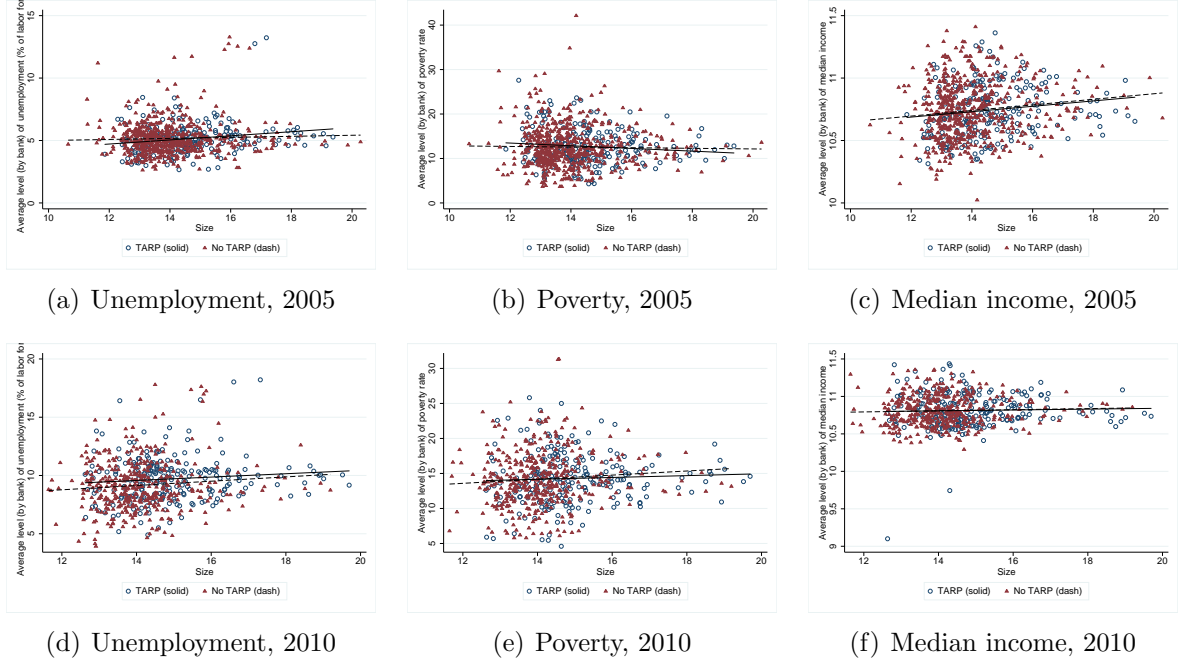
(see Figure 1). For the different measures of small business loan originations, we document the per-quarter averages distinguishing between bank groups (TARP vs NO TARP)⁶.

3.4.3 County socio-economic features

The importance of leading the analysis per county can also be motivated by the uneven density of banks across counties, which might reflect an unequal distribution of business opportunities. These differences could drive our results. Therefore, it is of relevance to conduct an accurate analysis of the relationship between bank investment strategies and county features. For each bank and year, we compute the average of the unemployment rate, the poverty rate and the median income of the counties where the bank has loan activities. We are interested in assessing the relationship between these indicators and bank size. As documented in Figure 2, there are no substantial differences across the two groups of banks. This is true independently of the period considered. In particular, the results suggest that the average level of unemployment and poverty rates of the counties where a bank provides loans is weakly positively correlated with its size. A positive relationship for the two groups of banks characterises the relationship between the average median income of the countries where a bank has a lending activity and its size. This relationship disappears in 2010. It follows that bank size is not the main determinant in bank investment decision.

⁶Each observation receives the same weight in the aggregation process.

Figure 2: Scatter plot of average level of different socio-economic indicators of counties where banks provide loans and bank size



Notes: For TARP and NO TARP banks we report the scatter plot between average values of unemployment rate, poverty rate, average median income of counties where a bank provides loans and its size for the years 2005 and 2010. The solid and dashed lines refer to the fitted values for the TARP and NO TARP groups.

4 Econometric Strategy

4.1 Specification

We estimate a panel regression based on the following specification:

$$\begin{aligned}
 LOANS_{i,j,t} = & \beta_1 TARP_{i,t} + \beta_2 TARP \times SIZE_{i,t} + \beta_3 TARP \times CAPRATIO_{i,t} \\
 & + \beta_4 SIZE_{i,t} + \beta_5 NPL_{i,t} + \beta_6 TOTLOANS_{i,t} + \beta_7 RELOANS_{i,t} \\
 & + \beta_8 CAPRATIO_{i,t} + \beta_9 NOCORE_PA_{i,t} + \beta_{10} TOT_UNCOMM_{i,t} \\
 & + \alpha_{i,j} + \delta_t + \xi_{i,j,t}
 \end{aligned} \tag{2}$$

The dependent variable is total small business loan origination by bank i in county j

during year t . We include bank-county⁷ and year fixed effects ($\alpha_{i,j}$ and δ_t , respectively). The inclusion of *SIZE* has the aim to control for the size of the bank in the lending activity: larger banks could provide more loans because of their size. *NPL* captures potential pressures on bank lending activity due to non-performing loans. *TOT LOANS* captures the overall loan activity of the bank. *RELOANS* controls for bank exposure in the real estate market. *CAPRATIO* is added to measure the potential impact of bank soundness on bank loan provision. Finally, *TOT UNCOMM* and *NOCORE PA* capture, the potential liquidity risk, and the effect of the bank’s financing sources (in particular for wholesale funding) on the dependent variable. The inclusion of this set of variables is in line with previous contributions in the same field (see Gozzi and Goetz, 2010). The effect of the TARP program on small business loan originations is captured by *TARP*, which takes value one from the moment the bank benefits from the TARP program and zero otherwise. In the main specification, we also include two interaction variables. Firstly, the interaction of TARP with *SIZE* captures a size effect as documented by Li (2011): mostly small banks participated in TARP (with the exception of the nine banks that were forced to participate, which we exclude, as described earlier). Secondly, the TARP interaction with *CAPRATIO* controls for the capitalisation effect: less well capitalised banks might use TARP funds to increase their capital buffer instead of providing loans. In all estimations we cluster standard errors per bank.

4.2 Selection

TARP participation is not random: banks first decide to apply for TARP and are then evaluated by the US Treasury for eligibility. As Taliaferro (2009) points out, the Treasury rejected less than 16% of the institutions that applied for TARP. The main issue about selection thus concerns the bank’s decision to participate in TARP.

To identify a causal relation between TARP participation and loan origination we use the ownership structure of a bank and in particular whether a bank is part of a bank

⁷We also estimate the model by employing bank and county fixed effects separately. The main results do not change and are available upon request.

holding company (BHC). In our sample, there are three different cases: BHCs controlling more than one bank; BHCs with a unique bank; and banks not controlled by a BHC. The aim is to create a group of TARP banks which is not prone to the selection issue.

As described above, TARP was a direct equity infusion for the bank by the US treasury. A major driver for participation in TARP was financial distress, which can be measured by low capital ratios. When considering participation in TARP of BHCs, the main assumption behind our top-down perspective is that a BHC's decision to participate in TARP relies not on the overall financial strength of all controlled banks, but on the banks in financial distress (that is, on banks with low capital ratios). Therefore, to banks within a BHC with high capital ratios, TARP participation can be considered as exogenous. In other words, banks with high capital ratios, if not belonging to a BHC controlling banks with low capital ratios, would not need extra financial support through rescue programs such as TARP. In sum, to create the exogenous TARP banks group, we proceed as follows. Using 2007 data, we compute the average Tier 1 capital ratio for each BHC. A bank is included in the exogenous TARP banks group if it belongs to a BHC that received TARP funds, and if it has a Tier 1 capital ratio higher than the BHC average.

We then proceed to choose a comparable control group. Since our TARP group consists only of banks owned by a BHC, we restrict the control group to NO TARP banks with a BHC.⁸ In a first step, we choose all NO TARP banks that are part of a BHC. Since our TARP group only features banks with relatively high capital ratios, we further restrict the control group to NO TARP banks that have comparable levels of *CAPRATIO*. Technically, we use propensity score matching on *CAPRATIO* to select the nearest neighbour for each included TARP bank.

⁸We run the baseline regressions also for the entire sample and find that our results hold.

5 Hypotheses and Results

5.1 TARP effect on bank loans

Equation (2) allows us to test the hypothesis as to whether the TARP program has an impact on loan provision. Specifically, our hypothesis is that:

H1: Banks that benefited from the TARP program provide more loans than the other banks.

The results reported in columns (1) and (2) of Table 4 confirm *H1*. In particular, as shown in column (1), the TARP program increases bank small business loan originations by 19%. In column (2) we add the interaction terms $TARP \times SIZE$ and $TARP \times CAPRATIO$. When computing the marginal effect of the TARP program we measure $SIZE$ and $CAPRATIO$ at the average values of the TARP banks for the period between 2007 and 2010. Although the marginal effect of TARP for the average bank is statistically not significant, column (2) highlights that the TARP effect depends on a bank's Size and on the Capital Ratio. In particular, banks with already high capital ratios increase loan origination more when benefiting from TARP. From this first analysis we can conclude that the TARP program met its goal to help banks in financing small businesses and households. The results can be justified by using a simple banking model⁹, where banks have capital ratios targets to meet in each period. If a bank incurs losses (possibly due to loan write-downs), its equity is lowered and the bank has to act to re-establish the desired capital ratio. It can either increase equity or cut the asset side. Peek and Rosengren (1995) show that, above all during a crisis, the first possibility is more expensive. Therefore, the easiest thing to do is to reduce the asset side. If banks are provided with new equity, they can increase the capital ratio without cutting credit. According to our results, this is exactly what the TARP program did.

⁹See for instance Shrieves and Dahl (1992), Jacques and Nigro (1997), Aggarwal and Jacques (2001), Jokipii and Milne (2011).

5.2 Disentangling the demand side effect

Until now we control for the demand side effect only through county dummy variables. Since we have socio-economic information on a county level, we are able to focus on the effect of specific characteristics at the county level. We add variables to Equation (2): *POVERTY*, *UNEMPLOYMENT* and the interactions with the TARP program dummy variable: $TARP \times POV$ and $TARP \times UNEMP$. The two socio-economic variables might be correlated, as for example an extensive period of high unemployment in a county leads to higher poverty rates. However, we claim that the two variables capture different issues: *POVERTY* captures chronic economic problems, while *UNEMPLOYMENT* is more related to temporary economic frictions. To support our claim, we calculate for each county the standard deviation over time of the two variables and then calculate the average values over all counties. We find that unemployment shows higher variability than poverty (.98 versus .74), confirming our intuition that unemployment captures higher frequency issues.

Table 1: Autocorrelation of POVERTY and UNEMPLOYMENT

UNEMPLOYMENT				
$t \qquad t-1 \qquad t-2$				
UNEMPLOYMENT	t	1.0000		
	$t-1$	0.8552	1.0000	
	$t-2$	0.6393	0.8180	1.0000

POVERTY				
$t \qquad t-1 \qquad t-2$				
POVERTY	t	1.0000		
	$t-1$	0.9647	1.0000	
	$t-2$	0.9453	0.9641	1.0000

support. In this context, even if banks benefit from the TARP program, and therefore potentially have additional resources to invest, they do not find any type of demand for loans. It follows that, in this context, the TARP program is not effective. The findings reported in Table 6 confirm our intuitions: unemployment and poverty negatively impact the provision of new loans. Moreover, the positive coefficients of $TARP \times UNEMPLOYMENT$ highlight the TARP increase loan origination in counties with temporary economic problems (high unemployment). Instead, the negative coefficients on $TARP \times POVERTY$ show that the program is useless in counties that suffer from more persistent economic issues (high poverty). When computing the total effect of the TARP program for the average TARP bank and the average county, we find that TARP still has a positive and statistically significant effect on loan origination for LOANS 0 and LOANS 1.

6 Robustness

6.1 Loan size

As described in Section 3, the CRA data set provides data about loans distinguishing by small, medium and large loans. We test our hypotheses by using LOANS 1, LOANS 2 and LOANS 3 as dependent variables separately. As reported in Table 4 (columns (3)–(8)), the result for TARP effectiveness is different for different loan sizes, but does qualitatively not change much.

6.2 Loan provision

As documented in subsection 3.3 TARP banks provide more loans than the other banks independently from the period analysed. It could be that the results obtained are not related to the TARP program but they can be ascribed to this feature of the TARP banks. To control for this potential issue, we adopt two alternative strategies.

6.2.1 Placebo experiment

The first strategy consists in running a “placebo” experiment. More precisely, we consider the sample period from 2001 to 2007, prior to the crisis and the policy action. We still distinguish between TARP and NO TARP banks, but we fictionally assume that TARP participation took place four years earlier. Accordingly, a bank that participated in the true TARP program in 2009, participated in the placebo TARP program in 2005. We run the baseline regressions by using the placebo-sample. If our results are not driven by the fact that TARP banks *per se* provide more loans, we should find the TARP effect is statistically not significant. The results of the placebo experiment, reported in Table 8 confirm our intuition. In all the cases the TARP effect is always not significant. The only exception is column (1) when we do not include the interaction terms $TARP \times SIZE$ and $TARP \times CAPRATIO$. In this case the marginal effect is negative, but statistically significant only at 10%. According to the results, we can safely claim that our results are not driven by the fact that TARP banks always provide more loans than the rest of the banks.

6.2.2 Matching

The second strategy adopted is based on propensity score matching. More precisely, we match TARP banks with the others based on their loan provision types measured in 2005. In this way, we consider only banks that ex-ante show similar features but the participation in the TARP program. In the matched sample there are 594 banks (TARP and NO TARP) and 2744 counties¹⁰. The results of the baseline regression estimated using the matched sample are reported in Table 8. The results show that the TARP effect is still positive and statistically significant for all loan types. These results, together with those referring to the placebo experiment, suggest that our results are driven by the TARP program and not by the loan provision features that distinguish the TARP banks from

¹⁰The results of the average differences between TARP and NO TARP groups after the matching exercises are reported in Table 10 of the Appendix.

the others during the period analysed.

6.3 TARP amount

In the baseline analysis we do not control for the size of the financial support received by each bank in the context of the TARP program. Since most TARP funds have been provided to bank holding companies (BHC), we do not know exactly the amount received by each bank. We assume that each bank of a BHC receives TARP funds proportionally to its total assets over BHC total assets¹¹. We call this new variable $TARPAmount/TotalAssets$, which is bank specific and time variant. We modify the baseline model by replacing the TARP dummy by the new variable. The results, reported in Table 9, show that a 1 percentage point increase in TARP leads to a 4 percent increase in total small business loan originations. It follows that the participation as well as the amount received play a crucial role in the loan provision process.

6.4 Discussion

In this contribution we focus on the effect of the TARP program, and in particular of the CPP program, on small business loan originations. Our analysis focuses on banks that provide loans to small business, as reported in the CRA. From a general point of view, our findings highlight that the TARP program did increase small business loan originations. TARP banks provide on average 19 percent more loans than the rest of the banks. From this perspective the US Treasury through the CPP program avoided a stronger contraction in bank loan activity.

Our results highlight that TARP was effective when banks were investing in counties that were not in an economically distressed situation, or in those counties that suffer from cyclical economic problems. TARP is not effective in cases where banks invest in counties with persistent economic problems. The policy implication that follows is that TARP-like

¹¹This measure is potentially biased, since we only take into account subsidiaries of a BHC which are in our data set.

programs are more effective to alleviate temporary distressed situations. In contrast, to solve or reduce chronic episodes of economic distress the policy maker should implement alternative measures, and not necessarily through the banking system.

7 Conclusion

According to a report by the US Small Business Administration (Kobe, 2012), in 2008 Small Businesses (businesses with less than 500 employees) account for 46 percent of total non-farm GDP and about 50 percent in total non-farm employment. Moreover, as claimed by Berger and Udell (2002) “Small firms are [...] vulnerable because of their dependence on financial institutions for external funding. These firms simply do not have access to public capital markets.” This is confirmed from data collected by the The Federal Reserve Board (2003), where 87 percent of small firms report that their lender is a bank. From the above figures it is clear that sustaining small businesses is a national issue and is crucial for the entire US economy. During the last financial crisis, the US Treasury launched the Capital Purchase Program (CPP) in the framework of the Troubled Asset Relief Program (TARP) to help banks in their lending activity to support small businesses and households. Contrasting opinions characterise the debate about TARP. We assessed whether TARP through CPP achieved the goal of helping banks in sustaining loan activity to small businesses. We used a unique data set obtained by merging information from bank balance sheets (Call Reports, Fed of Chicago), TARP participation (US Treasury) and small business loan originations (Federal Financial Institutions Examination Council, FFIEC). We consider an annual data set from 2005 to 2010 with observations for each bank-county pair. Using a panel data approach (bank-county fixed effects, standard errors clustered by banks), our results highlight that TARP banks provide on average 19% higher small business loan originations than other banks. Poverty and unemployment are detrimental for loan provision. In particular, TARP is still effective in counties affected by unemployment issues, while this is not the case if the bank that participated in TARP is

located in counties suffering from poverty issues. When computing the total TARP effect we find that the results are not driven by a demand side effect. Several robustness checks confirm the main results. In particular, TARP-like programs may suffer from selection bias, because the participation in the program is not random. Our identification strategy is based on the BHC structure to construct an exogenous TARP banks group. The results show that the main findings are robust to the selection issue. Our results shed light on the effectiveness of the TARP program on a specific group of banks, those that provide loans to small businesses. The findings show that TARP was effective, but at the same time we provide evidence that local conditions play a role. In particular, we show that TARP is longer effective in counties suffering from high poverty.

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Appendices

A Tables

Table 2: Descriptive Statistics

Variable	mean	sd	p10	p50	p90
LOANS 0	8.236	1.866	5.787	8.375	10.52
LOANS 1	6.587	2.053	4.234	6.836	8.843
LOANS 2	6.112	2.856	0	6.815	8.925
LOANS 3	6.763	3.384	0	7.717	10.01
CAPRATIO	8.817	2.578	6.710	8.365	11.20
SIZE	14.17	1.381	12.81	13.92	16.05
TOTAL UNCOMM	.201	.283	.0775	.167	.299
NO CORE PA	.255	.127	.114	.242	.410
TOTAL LOANS	.641	.137	.467	.667	.789
RELOANS	.733	.168	.511	.757	.925
NPL	.0132	.0122	.00230	.0104	.0267

Notes: The descriptive statistics referring the different types of loans are bank-county based. The rest of the descriptive statistics refer to the bank level. The results refer to 2005. At bank-county level there are 10047 observations, 794 banks and 2634 counties. At bank level there are 794 observations that correspond also to the number of banks.

Table 3: Averages diff in diff (Unconditional)

	TARP		NO TARP	Diff.	
After	$\alpha + \beta_1 + \beta_2 + \beta_3$		$\alpha + \beta_1$	$\beta_2 + \beta_3$	
Before	$\alpha + \beta_2$		α	β_2	
Diff.	$\beta_1 + \beta_3$		β_1	β_3	

Variable	Before β_2	After $\beta_2 + \beta_3$	No TARP β_1	TARP $\beta_1 + \beta_3$	Diff in Diff β_3
LOANS 0	0.224*** (0.037)	0.468*** (0.039)	-0.700*** (0.040)	-0.456*** (0.036)	0.245*** (0.054)
LOANS 1	0.084** (0.041)	0.241*** (0.042)	-0.718*** (0.044)	-0.562*** (0.039)	0.156*** (0.058)
LOANS 2	0.323*** (0.057)	0.684*** (0.062)	-0.991*** (0.062)	-0.629*** (0.056)	0.362*** (0.084)
LOANS 3	0.504*** (0.067)	0.815*** (0.072)	-0.910*** (0.073)	-0.600*** (0.066)	0.310*** (0.098)
CAPRATIO	-0.456*** (0.031)	0.238*** (0.039)	0.696*** (0.040)	1.390*** (0.029)	0.694*** (0.050)
SIZE	1.256*** (0.040)	1.497*** (0.037)	-0.159*** (0.039)	0.082** (0.038)	0.241*** (0.054)
TOTAL UNCOMM	0.070*** (0.003)	0.055*** (0.002)	-0.055*** (0.003)	-0.070*** (0.002)	-0.015*** (0.004)
NO CORE PA	-0.011*** (0.003)	-0.024*** (0.002)	-0.042*** (0.003)	-0.055*** (0.002)	-0.013*** (0.003)
TOTAL LOANS	0.015*** (0.002)	0.018*** (0.002)	-0.011*** (0.003)	-0.008*** (0.002)	0.003 (0.003)
RELOANS	-0.053*** (0.003)	-0.035*** (0.003)	0.014*** (0.003)	0.032*** (0.003)	0.018*** (0.004)
NPL	0.000* (0.000)	0.007*** (0.001)	0.039*** (0.001)	0.046*** (0.000)	0.007*** (0.001)

Notes: ***, **, * represent significance at the 1, 5, 10% level, respectively. The statistics referring the different types are bank-county level based. The rest of the statistics are bank level based. The before period is 2005, the after period is 2010. TARP stays for the group of banks that received the financial support through the TARP program, while NO TARP includes the rest of the banks.

Table 4: TARP increases loan origination

Dependent variable:	LOANS 0		LOANS 1		LOANS 2		LOANS 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TARP	0.193** (0.091)	-1.541** (0.674)	0.195** (0.089)	-0.867 (0.628)	0.081 (0.062)	-0.875** (0.393)	0.128* (0.074)	-1.246*** (0.474)
TARP \times Size		0.065** (0.031)		0.027 (0.032)		0.043** (0.019)		0.064*** (0.022)
TARP \times Tier 1 ratio		0.075** (0.034)		0.071* (0.043)		0.028 (0.021)		0.036 (0.024)
Size	0.477*** (0.151)	0.420*** (0.160)	0.412*** (0.156)	0.378** (0.172)	0.347*** (0.100)	0.309*** (0.107)	0.274** (0.113)	0.219* (0.116)
Total Uncomm.	0.948 (0.705)	0.940 (0.721)	0.425 (0.691)	0.425 (0.696)	0.368 (0.406)	0.350 (0.418)	1.295*** (0.494)	1.266** (0.507)
Non-Core Fin.	1.130** (0.439)	1.117*** (0.428)	0.546 (0.360)	0.524 (0.351)	0.708*** (0.260)	0.711*** (0.253)	0.875** (0.349)	0.883*** (0.338)
Tier 1 Ratio	0.010 (0.014)	0.000 (0.016)	0.001 (0.011)	-0.008 (0.010)	0.009 (0.007)	0.005 (0.009)	0.010 (0.008)	0.003 (0.010)
Total Loans	0.531 (0.448)	0.372 (0.448)	0.381 (0.358)	0.266 (0.386)	1.123*** (0.302)	1.018*** (0.301)	1.114*** (0.320)	0.969*** (0.301)
Real Est. Loans	-0.682 (0.712)	-0.690 (0.705)	-0.648 (0.513)	-0.658 (0.509)	-0.328 (0.468)	-0.328 (0.465)	-0.329 (0.431)	-0.328 (0.424)
Non-Perf. Loans	-2.637*** (0.853)	-2.887*** (0.961)	-1.108* (0.617)	-1.336* (0.684)	-1.526*** (0.504)	-1.697*** (0.593)	-1.966*** (0.486)	-2.209*** (0.582)
Marginal effect TARP	0.193	0.0835	0.195	0.154	0.0814	0.00935	0.128	0.0206
p-value	0.0344	0.261	0.0293	0.0888	0.192	0.851	0.0824	0.732
Obs.	19276	19276	18392	18392	15904	15904	15279	15279
Banks	354	354	350	350	353	353	350	350
Counties	2031	2031	2017	2017	1897	1897	1833	1833

Notes: ***, **, * represent significance at the 1, 5, 10% level. Estimates of a panel regression including bank-county and time fixed effects for the sample period 2005–2010. Standard errors are clustered by bank and shown in parentheses. The “Marginal effect TARP” is the sum of the estimated coefficients of TARP, TARP \times Size and TARP \times Capratio, where Size and Capratio are evaluated at their average values for TARP banks between 2007 and 2010. Columns (1), (3), (5), and (7) do not include the interaction terms between TARP and SIZE and TARP and Capratio. The other columns include these two additional variables. Columns (1) and (2) refer to the total small business loan originations, while columns (3)–(8) refer to the different type of loans: $\leq 100k$, $\leq 250k$ and $\leq 1m$.

Table 5: TARP increases loan origination, with matched control group

Dependent variable:	LOANS 0		LOANS 1		LOANS 2		LOANS 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TARP	0.255*** (0.096)	-1.093* (0.603)	0.248*** (0.093)	-1.200* (0.617)	0.212** (0.095)	-0.841* (0.452)	0.174 (0.110)	-1.053** (0.450)
TARP \times Size		0.046 (0.029)		0.043* (0.022)		0.048*** (0.018)		0.050** (0.022)
TARP \times Tier 1 ratio		0.071** (0.030)		0.089* (0.050)		0.033 (0.024)		0.049** (0.022)
Size	0.840*** (0.135)	0.731*** (0.167)	0.593*** (0.124)	0.488*** (0.130)	0.582*** (0.110)	0.474*** (0.114)	0.679*** (0.120)	0.566*** (0.134)
Total Uncomm.	-0.802 (0.577)	-0.841 (0.581)	-0.993 (0.735)	-1.018 (0.695)	-0.370 (0.515)	-0.425 (0.485)	-0.012 (0.497)	-0.069 (0.496)
Non-Core Fin.	1.584*** (0.550)	1.529*** (0.515)	1.011 (0.629)	0.881 (0.561)	0.806* (0.447)	0.844* (0.454)	1.140** (0.543)	1.165** (0.541)
Tier 1 Ratio	0.022 (0.019)	-0.000 (0.016)	0.026 (0.026)	-0.003 (0.018)	0.028** (0.012)	0.015 (0.013)	0.017 (0.014)	-0.001 (0.014)
Total Loans	1.581*** (0.491)	1.257** (0.544)	1.115** (0.530)	0.719 (0.628)	0.983** (0.474)	0.762 (0.468)	1.284*** (0.484)	1.023* (0.524)
Real Est. Loans	-0.856 (0.878)	-0.940 (0.877)	-1.073 (0.760)	-1.193 (0.768)	-0.539 (1.084)	-0.525 (1.084)	-1.995** (0.970)	-2.039** (0.969)
Non-Perf. Loans	-6.389*** (2.035)	-7.338*** (2.147)	-5.423*** (1.735)	-6.513*** (1.815)	-4.734*** (1.719)	-5.414*** (1.754)	-3.471** (1.690)	-4.335** (1.758)
Marginal effect TARP	0.255	0.215	0.248	0.219	0.212	0.158	0.174	0.122
p-value	0.00991	0.0430	0.00977	0.0491	0.0290	0.114	0.118	0.265
Observations	4377	4377	4222	4222	3754	3754	3640	3640
Banks	70	70	70	70	70	70	68	68
Counties	865	865	857	857	804	804	768	768

Notes: ***, **, * represent significance at the 1, 5, 10% level. Estimates of a panel regression including bank-county and time fixed effects for the sample period 2005–2010. Standard errors are clustered by bank and shown in parentheses. The control group is constructed by using propensity score matching to select only NO TARP banks that are part of a BHC and have comparable levels of capital ratios as the TARP group. The “Marginal effect TARP” is the sum of the estimated coefficients of TARP, TARP \times Size and TARP \times Capratio, where Size and Capratio are evaluated at their average values for TARP banks between 2007 and 2010. Columns (1), (3), (5), and (7) do not include the interaction terms between TARP and SIZE and TARP and Capratio. The other columns include these two additional variables. Columns (1) and (2) refer to the total small business loan originations, while columns (3)–(8) refer to the different type of loans: $\leq 100k$, $\leq 250k$ and $\leq 1m$.

Table 6: Demand side effect: poverty and unemployment

Dependent variable:	LOANS 0 (1)	LOANS 1 (2)	LOANS 2 (3)	LOANS 3 (4)
TARP	.383 (.454)	.505 (.518)	.405 (.343)	.228 (.354)
TARP \times Size	-.015 (.020)	-.027 (.025)	-.015 (.017)	-.007 (.017)
TARP \times Tier 1 ratio	-.011 (.022)	.001 (.024)	-.017 (.016)	-.012 (.017)
TARP \times Δ UNEMPL	.019* (.010)	.005 (.009)	.012 (.008)	.025*** (.006)
TARP \times Δ POVERTY	-.007** (.003)	-.008** (.003)	-.006** (.002)	-.004* (.002)
Δ POVERTY	-.005 (.003)	-.001 (.004)	-.004 (.003)	-.005 (.004)
Δ UNEMPLOYMENT	-.020* (.012)	-.013 (.010)	-.012 (.008)	-.029*** (.009)
Size	.328*** (.112)	.340** (.139)	.246*** (.094)	.219** (.097)
Total Uncomm.	.211** (.086)	.117 (.117)	.122 (.178)	.473* (.274)
Non-Core Fin.	.739** (.370)	.728* (.385)	.511** (.258)	.595** (.262)
Tier 1 Ratio	-.006 (.014)	-.019 (.023)	.002 (.012)	-.001 (.010)
Total Loans	.395 (.346)	.109 (.369)	.600** (.264)	.593* (.302)
Real Est. Loans	-.011 (.419)	.134 (.493)	-.057 (.327)	-.205 (.309)
Non-Perf. Loans	-2.164*** (.668)	-1.426** (.662)	-1.297*** (.438)	-1.754*** (.518)
Marginal effect TARP	.0852	.126	.0507	.0494
p-value	.0732	.00702	.193	.257
Obs.	57497	55580	48054	46872
Banks	1038	1022	1021	1024
Counties	2725	2718	2599	2514

Notes: ***, **, * represent significance at the 1, 5, 10% level. Estimates of a panel regression including bank-county and time fixed effects for the sample period 2005–2010. Standard errors are clustered by bank and shown in parentheses. The “Marginal effect TARP” is the sum of the estimated coefficients of TARP, TARP \times Size, TARP \times Capratio, TARP \times Δ Poverty and TARP \times Δ Unemployment where Size and Capratio are evaluated at their average values for TARP banks between 2007 and 2010, and Δ Poverty and Δ Unemployment are evaluated at their average values for TARP banks between 2000 and 2010. Columns (1) to (4) report the results for the entire sample.

Table 7: Matching NO TARP banks on observables

Dependent variable:	LOANS 0		LOANS 1		LOANS 2		LOANS 3	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
TARP	0.138** (0.065)	0.298 (0.458)	0.097 (0.066)	0.544 (0.564)	0.080 (0.051)	0.428 (0.349)	0.118* (0.063)	0.168 (0.368)
TARP \times Size		-0.007 (0.020)		-0.024 (0.026)		-0.012 (0.017)		0.001 (0.017)
TARP \times Tier 1 ratio		-0.005 (0.024)		-0.004 (0.028)		-0.019 (0.018)		-0.008 (0.018)
Size	0.369*** (0.124)	0.371*** (0.124)	0.378*** (0.144)	0.383*** (0.146)	0.258** (0.104)	0.264** (0.104)	0.227** (0.108)	0.228** (0.108)
Total Uncomm.	0.030 (0.400)	0.035 (0.401)	-0.255 (0.487)	-0.228 (0.489)	0.128 (0.284)	0.128 (0.281)	0.376 (0.308)	0.370 (0.308)
Non-Core Fin.	0.942** (0.413)	0.937** (0.410)	0.828* (0.466)	0.778* (0.433)	0.564* (0.319)	0.578* (0.324)	0.873*** (0.316)	0.894*** (0.318)
Tier 1 Ratio	-0.017 (0.019)	-0.015 (0.021)	-0.025 (0.024)	-0.022 (0.032)	-0.004 (0.014)	0.004 (0.016)	-0.008 (0.012)	-0.004 (0.013)
Total Loans	0.140 (0.422)	0.149 (0.432)	-0.007 (0.433)	0.046 (0.439)	0.309 (0.329)	0.315 (0.337)	0.402 (0.374)	0.391 (0.385)
Real Est. Loans	-0.071 (0.463)	-0.092 (0.453)	0.319 (0.554)	0.250 (0.519)	0.077 (0.393)	0.037 (0.389)	-0.251 (0.381)	-0.248 (0.361)
Non-Perf. Loans	-2.347*** (0.842)	-2.316*** (0.846)	-1.482* (0.766)	-1.377* (0.793)	-1.592** (0.642)	-1.514** (0.649)	-2.117*** (0.737)	-2.111*** (0.743)
Marginal effect TARP	0.138	0.152	0.0972	0.150	0.0796	0.0980	0.118	0.114
p-value	0.0339	0.0116	0.144	0.00512	0.118	0.0403	0.0608	0.0534
Obs.	44923	44923	43751	43751	37502	37502	36446	36446
Banks	405	405	403	403	402	402	402	402
Counties	2589	2589	2577	2577	2466	2466	2398	2398

Notes: ***, **, * represent significance at the 1, 5, 10% level. Estimates of a panel regression including bank-county and time fixed effects for the sample period 2005–2010. Standard errors are clustered by bank and shown in parentheses. The “Marginal effect TARP” is the sum of the estimated coefficients of TARP, TARP \times Size and TARP \times Capratio, where Size and Capratio are evaluated at their average values for TARP banks between 2007 and 2010. We estimate our model using a matched sample, where the matching is performed using propensity score matching with nearest neighbour on the variables *SIZE*, *CAPRATIO*, *TOT_UNCOMM*, *NOCORE_PA*, *TOT_LOANS_REALOANS*, *NPL*, *POVERTY* and *UNEMPLOYMENT* in 2005. Columns (1), (3), (5), and (7) do not include the interaction terms between TARP and SIZE and TARP and Capratio. The other columns include these two additional variables. Columns (1) and (2) refer to the total small business loan originations, while columns (3)–(8) refer to the different type of loans: $\leq 100k$, $\leq 250k$ and $\leq 1m$.

Table 8: Placebo effect and Matching

Type of strategy:	Placebo					Matched				
Dependent variable:	LOANS 0	LOANS 0	LOANS 1	LOANS 2	LOANS 3	LOANS 0	LOANS 0	LOANS 1	LOANS 2	LOANS 3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
TARP	-.083 (.053)	1.524*** (.495)	2.075*** (.639)	1.783*** (.666)	2.367*** (.664)	.117** (.056)	.306 (.464)	.561 (.536)	.362 (.357)	.172 (.375)
TARP \times Size		-.066** (.026)	-.096*** (.037)	-.077** (.031)	-.094*** (.033)		-.009 (.020)	-.027 (.026)	-.012 (.017)	-.002 (.017)
TARP \times Tier 1 ratio		-.065** (.029)	-.074** (.037)	-.073* (.041)	-.109*** (.037)		-.005 (.023)	-.003 (.025)	-.014 (.017)	-.007 (.018)
Size	.376*** (.102)	.418*** (.085)	.393*** (.119)	.554*** (.128)	.564*** (.119)	.357*** (.114)	.360*** (.115)	.352*** (.133)	.271*** (.096)	.241** (.100)
Total Uncomm.	.234 (.161)	.292* (.167)	.098 (.215)	.643* (.215)	.409 (.265)	.034 (.375)	.039 (.376)	-.212 (.449)	.075 (.244)	.442 (.290)
Non-Core Fin.	-.175 (.343)	-.245 (.302)	-.002 (.381)	-.452 (.493)	-.484 (.539)	.788** (.344)	.780** (.340)	.696* (.359)	.559** (.260)	.728*** (.261)
Tier 1 Ratio	-.020 (.019)	-.005 (.011)	-.017 (.020)	-.011 (.023)	.008 (.019)	-.017 (.016)	-.015 (.016)	-.020 (.024)	-.002 (.013)	-.006 (.011)
Total Loans	.736*** (.275)	.713*** (.256)	.969** (.376)	.244 (.431)	1.265*** (.447)	.092 (.363)	.101 (.369)	.143 (.363)	.478* (.273)	.507* (.306)
Real Est. Loans	-.375 (.322)	-.374 (.283)	-.312 (.407)	-.644 (.399)	-.215 (.517)	-.099 (.440)	-.120 (.435)	.248 (.455)	.102 (.341)	-.138 (.315)
Non-Perf. Loans	-1.266 (1.158)	-1.089 (1.059)	3.131 (2.119)	-2.399 (1.772)	-3.826 (2.432)	-2.768*** (.603)	-2.740*** (.604)	-1.294** (.594)	-1.645*** (.455)	-2.094*** (.517)
Marginal Effect TARP	-.0827	.0408	.0865	.0771	.126	.117	.135	.136	.0721	.0820
p-value	.121	.346	.143	.264	.115	.0376	.0112	.00444	.0773	.0910
Obs.	54994	54994	54994	54994	54994	56333	56333	54441	46778	45579
Banks	985	985	985	985	985	702	702	698	701	701
Counties	2752	2752	2752	2752	2752	2752	2752	2746	2629	2551

Notes: ***, **, * represent significance at the 1, 5, 10% level, respectively. Estimates of a panel regression including bank-county and time fixed effects for the sample period 2001–2007 (columns (1)–(5)) or 2005–2010 (columns (6)–(10)). Standard errors are clustered by bank and shown in parentheses. The “Marginal effect TARP” is the sum of the estimated coefficients of TARP, TARP \times Size and TARP \times Capratio, where Size and Capratio are evaluated at their average values for TARP banks between 2003 and 2005 (columns (1)–(5)) or between 2007 and 2010 (columns (6)–(10)). Columns (1)–(5) perform a Placebo experiment, where we anticipate the TARP treatment by 4 years. Columns (6)–(10) use a matched sample, where the matching is performed using propensity score matching with nearest neighbour on the variables small business loan originations *LOANS1*, *LOANS2* and *LOANS3* in 2005. Columns (1) to (5) report the results based on the placebo experiment. Columns (1) and (6) do not include the interaction terms between TARP and SIZE and TARP and CAPRATIO.

Table 9: The effect of TARP increases with TARP amount

Dependent variable:	LOANS 0	LOANS 1	LOANS 2	LOANS 3
	(1)	(2)	(3)	(4)
TARP Amount / Total Assets	3.968** (1.915)	5.128** (2.138)	1.461 (1.484)	2.288 (1.878)
Size	.375*** (.115)	.384*** (.145)	.274*** (.093)	.234** (.097)
Total Uncomm.	.287*** (.095)	.226* (.128)	.180 (.184)	.474* (.273)
Non-Core Fin.	.827*** (.315)	.918** (.429)	.562** (.234)	.621** (.246)
Tier 1 Ratio	-.009 (.013)	-.019 (.018)	-.004 (.010)	-.004 (.009)
Total Loans	.119 (.338)	.055 (.326)	.461* (.258)	.536* (.281)
Real Est. Loans	-.090 (.426)	.459 (.544)	.061 (.324)	-.186 (.307)
Non-Perf. Loans	-2.391*** (.589)	-1.311** (.510)	-1.393*** (.415)	-1.937*** (.452)
Marginal effect TARP	3.968	5.128	1.461	2.288
p-value	.0385	.0166	.325	.223
Obs.	62021	59798	51438	50177
Banks	1048	1032	1031	1034
Counties	2812	2805	2684	2599

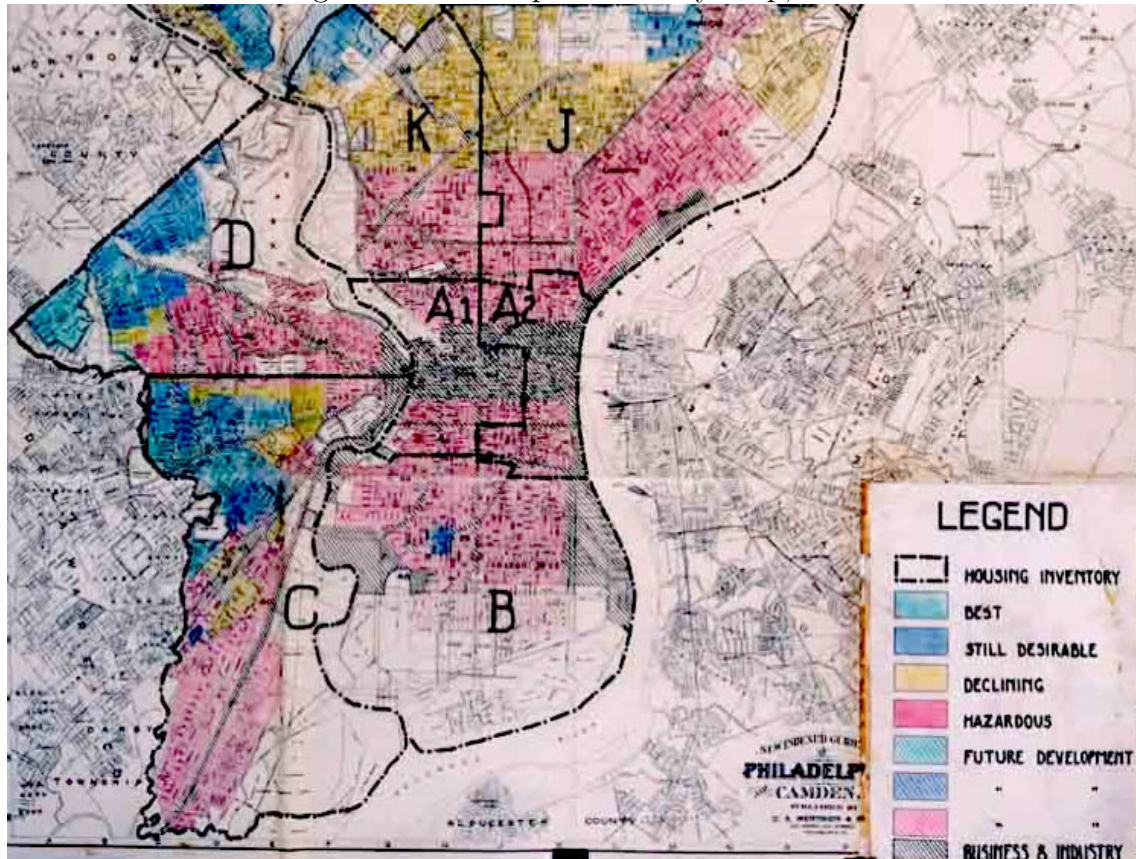
Notes: ***, **, * represent significance at the 1, 5, 10% level, respectively. Estimates of a panel regression including bank-county and time fixed effects for the sample period 2005–2010. Standard errors are clustered by bank and shown in parentheses. Columns (1) refers to total small business loan originations, while columns (2), (3), and (4) refer to the different type of loans: $\leq 100k$, $\leq 250k$ and $\leq 1m$.

Table 10: Descriptive statistics matched groups

Matching 1: year 2005, bank level	TARP	No TARP	Diff in Diff
Size	14.641	14.415	0.226 (0.146)
Tier 1 Ratio	8.221	8.430	-0.209 (0.182)
Total Uncomm.	0.223	0.234	-0.011 (0.032)
Non-Core Fin.	0.267	0.270	-0.003 (0.012)
Total Loans	0.671	0.679	-0.007 (0.011)
Real Est. Loans	0.712	0.707	0.005 (0.016)
Non-Perf. Loans	0.012	0.014	-0.003*** (0.001)
Obs.	213	192	405
Matching 2: year 2005, bank-county level	TARP	No TARP	Diff in Diff
SBL 0	8.893	8.701	0.192 (0.173)
SBL 1	7.115	6.720	0.395* (0.205)
SBL 2	6.998	6.795	0.204 (0.242)
SBL 3	7.699	7.579	0.120 (0.284)
Obs.	213	292	505
Matching 3: year 2007, BHC level	TARP	No TARP	Diff in Diff
Tier 1 Ratio	9.262	9.506	-0.244 (0.739)
Obs.	39	31	70

Notes: ***, **, * represent significance at the 1, 5, 10% level, respectively. Standard errors in parenthesis. Propensity score matching refers to 2005 data. Matching 1 is based on the following variables: *SIZE*, *CAPRATIO*, *TOT_UNCOMM*, *NOCORE_PA*, *TOT_LOANS_REALOANS*, *NPL*, *POVERTY* and *UNEMPLOYMENT*. Matching 2 is based on the following variables: *LOANS 1*, *LOANS 2* and *LOANS 3*. Matching 3 is based on *CAPRATIO*.

Figure 3: Philadelphia Security Map, 1936



Notes: In the map above, the Philadelphia Security Map in 1936, by the Home Owners' Loan Corporation Philadelphia is reported. The different colours reflect the different riskiness in investing. The red colour refers to zones where investing is considered hazardous, see the legend. Source: Cartographic Modeling Lab, UPenn.

Table 11: Sources and definitions of the variables

Variable Label	Variable definition	Source
TARP	Takes value 1 if a bank received TARP sustain at least once, and 0 otherwise.	Federal Reserve Board
TARPDUMMY	Takes value 1 from the year (quarter) a bank received TARP sustain and zero before.	Federal Reserve Board
ALO_1	Amount of Small Business Loan Originations $\leq 100k$	CRA
ALO_2	Amount of Small Business Loan Originations $\leq 250k$	CRA
ALO_3	Amount of Small Business Loan Originations $\leq 1m$	CRA
ALO_0	$ALO_1 + ALO_2 + ALO_3$	CRA
$LOANS_1$	\log of $(1 + ALO_1)$	CRA
$LOANS_2$	\log of $(1 + ALO_2)$	CRA
$LOANS_3$	\log of $(1 + ALO_3)$	CRA
$LOANS_0$	\log of $(1 + ALO_0)$	CRA
TOTAL ASSETS	On- and Off-Balance Sheet assets RCFDB696 + RCFDB697 + RCFDB698 + RCFDB699	U.S. Call Reports
SIZE	Log of 1+ banks total asset $\log(1 + \text{TOTAL ASSETS})$	U.S. Call Reports
$TLOANS_{PA}$	Total loans and Leases, Gross over total assets RCFD1400/TOTAL ASSETS	U.S. Call Reports
RELOANS	Real Estate Loans over total loans RCFD1410/RCFD1400	U.S. Call Reports
CAPRATIO	Tier 1 (core) capital divided by adjusted total assets RCFD8274	U.S. Call Reports
NPL	Loans that are past due at least 30 days or are on non-accrual basis over total loans (RCFD1403 + RCFD1406 + RCFD1407)/RCFD1400	U.S. Call Reports
TOT_{UNCOMM}	fraction of total unused loan commitments over total assets RCFD3423/TOTAL ASSETS	U.S. Call Reports
$NOCORE_{PA}$	fraction of total time deposits of at least \$ 100000, foreign office deposits, insured brokered deposits issued in denominations of less than \$ 100000, securities sold under agreements to repurchase, federal funds purchased, and other borrowed money over total assets (RCON2604 + RCFD3190 + RCON2343 + RCFDB993 + RCFDB995)/TOTAL ASSETS	U.S. Call Reports
POVERTY	estimated percentage of people of all ages in poverty	www.census.gov
MED INC	estimated of median household income	www.census.gov
UNEMPLOYMENT	ratio of people who do not have a job, have actively looked for work in the prior 4 weeks, and are currently available for work over total labour force	www.bls.gov