Journal of Banking & Finance 37 (2013) 4777–4792

Contents lists available at ScienceDirect

Journal of Banking & Finance

journal homepage: www.elsevier.com/locate/jbf

TARP funds distribution and bank loan supply ☆

Lei Li *

University of Kansas, School of Business, 1300 Sunnyside Avenue, Lawrence, KS 66045, United States

ARTICLE INFO

Article history:
Received 21 August 2012
Accepted 12 August 2013
Available online 27 August 2013

JEL classification:
E62
E65
G21
G28

Keywords:
TARP
Political connection
Regulatory connection
Credit supply
Loan demand

ABSTRACT

This paper investigates the determinants of the Troubled Asset Relief Program (TARP) funds distribution to banks and the stimulus effect of TARP investments on credit supply in the economy. Using banks' political and regulatory connections as instruments, this paper finds that TARP investments increased bank loan supply by an annualized rate of 6.36% for banks with below median Tier 1 capital ratios. This increase is found in all major types of loans and can be translated into $404 billion of additional loans for all TARP banks. On average, TARP banks employed about one-third of their TARP capital to support new loans and kept the rest to strengthen their balance sheets. Furthermore, there is little evidence that loans made by TARP banks had lower quality than those by non-TARP banks. In sum, this paper shows a positive stimulus effect of TARP on credit supply during the 2008–2009 financial crisis.

1. Introduction

The Troubled Asset Relief Program (TARP), established by the U.S. Treasury Department in October 2008 to shore up the financial system after Lehman Brothers' bankruptcy, was the largest government rescue program in U.S. history in terms of the funds appropriated. The goals of TARP were to stabilize the banking system and to stimulate loan supply in the economy. Since the inception of TARP, consumers and small businesses have accused TARP banks of withholding TARP capital rather than using it to increase lending.[1] On the other hand, banking regulators pushed TARP banks to increase their capital buffer before making new loans.[2] Despite all of these controversies, there has been little empirical evidence on the stimulus effect of TARP, or how banks have used their TARP capital.

The primary goal of this paper is to estimate the stimulus effect of TARP capital injections on bank loan supply.[3] The main empirical challenge of identifying TARP's effect on bank loan supply is to separate bank loan growth driven by TARP injections from bank loan growth driven by demand. An OLS estimation of TARP's effect on credit supply may be biased by unobservable loan demand variation correlated with the allocation of TARP funds. The sign of the bias likely depends on how TARP funds were allocated. For example, if TARP funds were more likely to be allocated to areas with weak loan demand (where distressed banks were more likely to reside), then OLS would understate TARP's effect on loan supply. If TARP funds were more likely to be allocated to areas with strong (but unserved) loan demand, which might have been the natural goal of policymakers, then OLS would overstate the effect of TARP funds on loan supply.

A two-step treatment effects model (Maddala, 1983; Wooldridge, 2010) is employed to estimate TARP's stimulus effect on bank loan supply. Banks' political and regulatory connections are used as exclusion restrictions (that is, *instruments* for the TARP bank dummy). The key underlying assumptions are that: (1) banks' political and regulatory connections had significant impacts on their probabilities of receiving TARP funds, and (2) these connections were unlikely to influence banks' operating strategies or to

☆ I especially thank Philip Strahan for his insightful comments and advice. I also thank Pierluigi Balduzzi, Mary Ellen Carter, David Chapman, Jie He, Edith Hotchkiss, Christopher James, Oguzhan Karakas, Darren Kisgen, Ike Mathur (the editor), Jeffrey Pontiff, Jun Qian, Jon Reuter, Jerome Taillard, Hassan Tehranian, Zhipeng Zhang, and an anonymous reviewer for helpful comments. All errors are my own.

* Corresponding author. Tel.: +1 785 864 8934.
E-mail address: lei.li@ku.edu

[1] See, for example, The Washington Post, February 3, 2009, "Despite Federal Aid, Many Banks Fail to Revive Lending"; NYT, January 9, 2009, "Bank Chiefs Curb Lending Despite TARP, Survey Says"; Congressional Oversight Panel Report, May 13, 2010, "The Small Business Credit Crunch and the Impact of the TARP".

[2] See, for example, The Associated Press, February 3, 2009, "Banks say regulators sending mixed signals on lending".

[3] Capital injections into banks were conducted under the Capital Purchase Program (CPP), which was the central piece of TARP. For convenience, CPP and CPP funds are referred to as TARP and TARP funds in this paper.

0378-4266/$ - see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.jbankfin.2013.08.009

be correlated with the level of loan demand.[4] The first-step estimation result confirms that banks' political and regulatory connections significantly increased their probabilities of receiving TARP funds. The validity of the second assumption is verified by placebo tests. If banks' political and regulatory connections were also correlated with their loan demand, then we should be able to observe this correlation all the time, not only in the TARP period. However, placebo tests show that political and regulatory connections were uncorrelated with bank loan growth prior to TARP.[5]

The main result of this paper is that, although politics played a role in TARP funds distribution, TARP capital injections still managed to significantly boost bank loan supply during the 2008–2009 crisis. TARP banks expanded their loan supply by 6.36% of total assets annually, which was statistically and economically significant and broadly based on all major types of loans. Equivalently, for each dollar of TARP investments, TARP banks, on average, made $2.54 more loans during 2008Q3–2009Q2. The Treasury Department had invested a total amount of $159 billion into commercial banks as of April 2009. These estimates suggest that TARP banks increased loan supply in the economy by $404 billion during the crisis.[6] This number is of the same order of magnitude as the $500 billion drop in new credit production in 2008Q4 documented by Cornett et al. (2011), implying that the credit crunch in 2008–2009 could have been substantially worse without TARP capital injections.

If we assume that TARP banks levered up their TARP capital to the ordinary loans-to-capital ratio of 8-to-1, then TARP banks needed to employ about one-third (i.e., 2.54/8) of their TARP capital to support these new loans. Comparison of the change in Tier 1 ratio at TARP and non-TARP banks confirms that TARP banks held about two-thirds of TARP capital to strengthen their capital base. The notion of banks saving two-thirds of newly raised capital is not as conservative as it sounds. In fact, in the decade before the 2008–2009 crisis, U.S. firms on average kept more than fifty cents as precautionary savings for each dollar of equity issuance proceeds (McLean, 2011).[7]

One concern that people may have is that the higher loan growth at TARP banks could have been driven by firms drawing down their credit lines with TARP banks. Drawdowns of pre-existing credit lines, which increased during the 2008–2009 crisis as firms rushed to hoard cash (Ivashina and Scharfstein, 2010), shifted off-balance sheet loan commitments onto the balance sheet, but did not expand "new" credit origination. To investigate whether TARP banks expanded their lending beyond fulfilling credit line drawdown requests, I construct a variable *Total credit* that equals the sum of (on-balance sheet) loans and (off-balance sheet) unused loan commitments (Cornett et al., 2011). This measure of credit is not affected by movements from off-balance sheet to the balance sheet, since the loan increases due to credit line drawdowns are fully offset by the decreases in unused loan commitments. Estimation results show that TARP banks increased their total credit supply by 7.90% of total assets, which was also statistically and economically significant.

People may also be concerned about the quality of the new loans stimulated by injections of TARP capital. If TARP banks were pushed by politicians to extend loans to politically connected firms like in the Japanese case in the 1990s (Hoshi and Kashyap, 2010), then the higher loan growth at TARP banks might actually be detrimental to the economy. To investigate this possibility, I examine the development of non-performing loans at TARP banks in the two years after the initiation of TARP, and do not find evidence that loans made by TARP banks had lower quality than those by non-TARP banks. Overall, these findings suggest that TARP capital injections had a positive stimulus effect on bank credit supply to the economy.

To the best of my knowledge, this paper is the first empirical study quantifying TARP's stimulus effect on bank loan supply. Bayazitova and Shivdasani (2012) investigate factors that affected publicly traded banks' decisions to apply for, reject and exit TARP and the valuation effects of TARP-related events. They find that factors like systemic risk, expected financial distress costs and asset quality were correlated with TARP investments, and that TARP capital infusions did not have a significant certification effect but the "stress tests" on major banks did. Duchin and Sosyura (2012) study the allocation of TARP capital to publicly traded banks and find that strong political connections increased the probability that a bank received TARP funds. Black and Hazelwood (forthcoming) and Duchin and Sosyura (2012) study TARP banks' risk-taking in the commercial loan and mortgage markets, respectively. Bayazitova and Shivdasani (2012) and Wilson and Wu (2012) look at the characteristics of TARP banks that exited TARP early. In particular, they find that banks with high levels of CEO pay were more likely to exit TARP early. Unlike these papers, this paper looks at both public and non-public banks and focuses on identifying the stimulus effect of TARP capital injections.

This paper is broadly related to the rich literature on financial and banking crises. Banking crises had significant negative effects on the real economy, especially on sectors dependent on bank financing (Rajan and Zingales, 1998; Krozner et al., 2007; Dell'Ariccia et al., 2008). This effect could largely be attributed to the reduction in banks' credit supply to the economy, which could be a result of a "capital crunch" at banks (see, e.g., Bernanke and Lown (1991) for the example of the 1990s). This paper empirically tests if capital injections could boost bank loan supply and thereby mitigate the negative impact of a banking crisis on the real economy.

Finally, this paper is also related to the literature on political connections and capital allocation, where previous studies are mostly conducted on foreign markets (e.g., Sapienza, 2004; Brown and Dinc, 2005; Dinc, 2005; Khwaja and Mian, 2005; Faccio, 2006; Faccio et al., 2006; Claessens et al., 2008). This paper provides new evidence that, in the U.S. market, firms' political ties can affect capital allocation and bailout decisions.

The rest of this paper is organized as follows. Section 2 provides institutional details on TARP with a focus on the Capital Purchase Program (CPP). Section 3 elaborates on the research questions and defines variables employed in empirical models. Section 4 describes the data. In Section 5, I present the main results on the TARP funds distribution model and TARP's effect on bank loan supply. Several robustness checks are conducted in Section 6. Section 7 provides concluding remarks.

2. The capital purchase program

In the wake of Lehman Brothers' bankruptcy, the U.S. Congress quickly passed the Emergency Economic Stabilization Act of 2008, aiming to "restore the liquidity and stability to the financial system." The Act authorized the Treasury Department to establish the Troubled Asset Relief Program (TARP) with an appropriation

[4] Technically, the treatment effects model can still be identified even when the second assumption is violated. However, in that case, the identification results from the non-linear functional form of the model, and the coefficient estimates are less reliable.

[5] Moreover, estimation results in this paper are not materially changed when lagged political and regulatory variables (as of 2006) are used, suggesting that it was not the case that banks with strong loan demand tried to "buy" connections right before the crisis to get access to government funds.

[6] TARP investments into Goldman Sachs, Morgan Stanley, American Express, Discover and thrifts are excluded when computing the numbers, as these financial institutions were not commercial banks and had no meaningful outstanding loans in 2008Q3. If we further exclude Wells Fargo and JPMorgan Chase, which might not be as capital-constrained, from the sample, the total TARP investments and loan supply increase would be $109 billion and $277 billion, respectively.

[7] Taliaferro (2009) compares TARP banks with matched non-TARP banks and finds that bank allocated much more of their new capital to support lending over the last business cycle (2001–2007) than in 2008–2009. However, results from matched samples might be biased by unobservable loan demand variation.

of up to $700 billion to "bailout" the U.S. financial system. In the original plan presented by then-Treasury Secretary Henry Paulson, the government would use the TARP funds to buy distressed assets in financial institutions. On October 14, 2008, Mr. Paulson announced a revision in the implementation of TARP; i.e., the Treasury Department would directly inject up to $250 billion of the TARP funds into the U.S. banking system through purchases of non-voting senior preferred stock and warrants in qualified financial institutions (QFIs). The Treasury Department set up a new program, the Capital Purchase Program (CPP), under the TARP umbrella to distribute the $250 billion to qualified financial institutions.[8]

The goal of the Capital Purchase Program was to strengthen the capital base of economically sound banks and increase the capacity of these banks to "lend to U.S. businesses and consumers and to support the U.S. economy." In other words, the Treasury Department wanted to use CPP funds to help economically healthy banks out of financial distresses, and to promote bank lending.

Qualified financial institutions (QFIs) included bank holding companies, financial holding companies, insured depository institutions, and savings and loan holding companies that were established and operating in the United States, and that were not controlled by a foreign bank or company. According to the Treasury Department, the total number of QFIs was about 8400, of which 1800 were public, 3475 were private with institutional shareholders, 2500 were S-Corps, and about 625 were mutual companies.

To participate in CPP, QFIs needed to first submit their applications to their primary federal regulator: the Federal Reserve, FDIC, OCC or OTS.[9] The application period for publicly traded financial institutions closed on November 14, 2008, and the application period for privately-held institutions closed on December 8, 2008. The application period for S-corporations ended on February 13, 2009.[10]

After reviewing an application, a federal banking regulator would send the application and its recommendation to the Office of Financial Stability at the Treasury Department. Based on the recommendation from federal banking regulators, the Treasury Department made the final decision on whether or not to make the capital purchase. All TARP investments were publicly announced within two business days of execution. The Treasury Department would not, however, disclose any applications that were withdrawn or rejected.

Under CPP, the Treasury Department provided capital to banks on standardized terms. The amount of CPP capital that a qualified financial institution (QFI) could apply for was restricted to between 1% and 3% of the QFI's risk-weighted assets. The preferred stock purchased by the Treasury Department would be treated as Tier 1 capital for regulatory purposes. The Treasury Department would be paid a 5% dividend on the preferred stock in the first five years, and a 9% dividend thereafter.[11] Accompanying warrants issued by the QFIs enabled the Treasury Department to purchase common stock of the QFIs of up to 15% of the initial CPP investments, which were designed to provide taxpayers an opportunity to participate in the equity appreciation of the QFIs.

The terms of CPP investments were quite attractive. Veronesi and Zingales (2010) estimate that, in the first 10 transactions of the CPP, the Treasury Department paid $125 billion for financial claims worth only $89–112 billion. The Congressional Oversight Panel issued an evaluation report on February 6, 2009, concluding that "... (for) all capital purchases made in 2008 under TARP, [the] Treasury paid $254 billion, for which it received assets worth approximately $176 billion, a shortfall of $78 billion." The generous terms of CPP attracted thousands of applicants.[12] However, only about 600 financial institutions received TARP funds.

For convenience, throughout this paper, I refer to CPP and CPP funds as TARP and TARP funds, and refer to all types of QFIs as banks.

3. Methodology

The primary goal of this paper is to estimate the stimulus effect of TARP investments on the credit *supply* in the economy, i.e., the part of bank loan growth that was driven by TARP capital injections; independent of loan demand for banks. Separating supply-side effects on loan growth from demand-side effects is always challenging in the banking literature. Many of the existing studies rely on exogenous shocks for identification. For example, Peek and Rosengren (2000) exploit the reduction in U.S. real estate lending by Japanese banks that was caused by a banking crisis in Japan rather than by changes in the U.S. market conditions. Ashcraft (2005) analyzes the failures of healthy subsidiaries of two multi-bank holding companies due to the failures of the unhealthy lead banks of the two bank holding companies.

TARP capital injections were not a natural experiment. They were not randomly assigned to banks. They could be correlated with banks' health status (on the supply side) and local loan demand (on the demand side). However, the unique setting of TARP allows me to employ a two-step treatment effects model with exclusion restrictions to identify the stimulus effect of TARP capital injections on bank loan supply. Banks' political and regulatory connections could affect the allocation of TARP funds, but they were unlikely to be correlated with loan demand. Hence, using banks' political and regulatory connections as exclusion restrictions can help us adjust for the non-randomness of TARP capital injections. The two-step model is specified as follows (Maddala, 1983, pp. 117–122; Wooldridge, 2010, pp. 804–806):

$$P(TARP = 1|X) = \Phi(\gamma_0 + \gamma_B' X_B + \gamma_{LE}' X_{LE} + \gamma_P' X_P), \quad (1)$$

$$\text{Loan growth} = \alpha + \beta_B' X_B + \beta_{LE}' X_{LE} + \beta_\lambda \lambda + \epsilon, \quad (2)$$

where Eq. (1) is the probit model of the TARP dummy, Φ is the cumulative distribution function of the standard normal distribution, and λ is the inverse Mills ratio from Eq. (1). Bank loan growth is modeled as a function of bank characteristics X_B, local economy status X_{LE}, and the TARP bank dummy. The financial health of a bank determined its ability to make loans, and could also affect its probability of receiving TARP funds. Observable local economic conditions are included to proxy for loan demand for banks. This model does *not* intend to perfectly control for loan demand, which is unobservable in nature. Instead, the identification relies on the exclusion restrictions X_P. Bank characteristics X_B and local economy status variables X_{LE} are defined in Section 3.1, and political and regulatory connection variables X_P are defined in Section 3.2.

[8] On March 30, 2009, the Treasury Department announced that the allocation to CPP was reduced to $218 billion.

[9] Bank holding companies needed to submit their applications to both the Fed (their primary regulator) and the primary regulator of their largest subsidiary.

[10] In anticipation of repayments of TARP investments from several big banks, the Treasury Department reopened TARP application in May 2009 to community banks (banks with less than $500 million of total assets) for six months. This second round of applications and investments targeted on one particular group of banks (community banks), and are out of the scope of this paper.

[11] Preferred stock of S-corporations would pay a 7.7% interest rate in the first 5 years, and 13.8% thereafter. Assuming a 35% corporate tax rate, 7.7% and 13.8% equal the after-tax effective rates of 5% and 9%, respectively.

[12] The exact number of applications was not disclosed. The Fact Sheet on the Treasury Department's website said that "the number of applications under review at the regulators is in the thousands, representing every state in the country."

3.1. Bank characteristics and local economy status

The CAMELS rating of a bank is a supervisory rating used by federal banking regulators to evaluate the bank's overall condition. The acronym CAMELS refers to the six components of a bank's condition assessed by examiners: *C*apital adequacy, *A*sset quality, *M*anagement, *E*arnings, *L*iquidity, and *S*ensitivity to market risk. Banking regulators generally believe these six components provide a comprehensive assessment of a bank's financial status. Anecdotal evidence suggested that federal banking regulators also made use of banks' CAMELS ratings when evaluating TARP applications.[13] Since the CAMELS ratings of banks are confidential, I use several bank characteristic variables to proxy for the six components of the CAMELS rating.

The Tier 1 ratio, defined as Tier 1 (core) capital divided by risk-weighted total assets, is widely used by regulators to measure a bank's ability to absorb potential losses on assets of different risk classes. I use the Tier 1 ratio to proxy for a bank's capital adequacy (C). I use the troubled assets ratio to approximate a bank's asset quality (A), which is computed by adding the amounts of loans past due 90 days or more, non-accrual loans and other real estate owned (primarily foreclosed property) and dividing that amount by the bank's capital and loan-loss reserves. Management quality is difficult to measure. The literature has suggested proxies like the age of a bank, percentage of insider loans, and the number of corrective actions taken by regulators. I choose to use the simplest one, the age of a bank, as the proxy for management quality (M).[14] Earning (E) is measured by the annualized ROA. Following Hirtle and Lopez (1999), I use the cash-to-assets ratio to proxy for liquidity (L). Finally, I approximate the sensitivity to market risk (S) by the loans-to-deposits ratio. After Lehman Brothers' bankruptcy, banks' funding costs rose substantially with the shutdown of the commercial paper market and shrinkage of wholesale funding markets. Many banks found it difficult to roll over their public debt. During this period, deposits became a particularly valuable funding source for banks (Cornett et al., 2011; Ivashina and Scharfstein, 2010).The loans-to-deposits ratio measures the stability of a bank's funding mix, and captures a bank's sensitivity to the funding market risk during the 2008–2009 crisis.

Besides the variables defined above, there are three more bank characteristics: size, exposure to the real estate market, and change in Tier 1 ratio, which might be related to the Treasury Department's TARP decisions and bank loan growth. Larger banks posed a greater systemic risk to the economy. Preventing the failure of larger banks would be more helpful in stabilizing the financial system as a whole. Hence bank size could be a factor in TARP decisions. The 2008–2009 financial crisis was deeply related to the meltdown of the housing market and the subsequent increase in mortgage default rates. A bank's exposure to the real estate market, measured by the weight of real estate loans in the bank's loan portfolio, might have affected its average asset quality (A). The change in a bank's Tier 1 ratio from 2007Q3 to 2008Q3, which measures how badly the bank was hit by the crisis, was also related to the bank's asset quality (A).

The status of the local economy was correlated with loan demand and was one major consideration in approving TARP applications.[15] I use congressional districts as "local-level" geographic regions in this study. Unlike counties or cities, all congressional districts in the U.S. have a roughly equal number of people. I associate each bank to a congressional district by the location of its headquarter, and take the economic status of a congressional district as the "local" condition for all banks headquartered in the district. This association of banks with congressional districts might be too restrictive for large banks with branches across states. However, for community banks that operated in a small region around their headquarters, this association is quite reasonable. Since community banks (with total assets <$1bn) accounted for over 92% of the total number of commercial banks in the U.S., this association should not weaken the research design.[16] From here on, "local" will refer to characteristics within a corresponding congressional district.

Three indicators of local economy status – the unemployment rate, the rate of home-price decline, and the percentage of workforce in the FIRE (finance, insurance, and real estate) industries – are included in the model. The unemployment rate is a traditional indicator of the strength of the local economy. Higher unemployment rates would usually mean lower demand for credit. The decline of home price proxies for the size of the housing bubble and the impact of the 2008–2009 crisis on the local economy. Among all industries, the FIRE industries bore the brunt of the crisis. A region with more people working in the FIRE industries was likely to lose more jobs during the crisis, and consequently the local economy might contract by more.

3.2. Political and regulatory connections

The evaluation process of TARP applications was not transparent. There were only two stipulations on whether banks could qualify for TARP funding: (1) banks were healthy as determined by their regulators, and (2) dividends paid on common stocks and compensation packages for bank executives must satisfy certain conditions.[17] These guidelines were neither very specific nor detailed. For outsiders, it was difficult, if not impossible, to tell if a bank could receive TARP funds based on these guidelines.

It was widely speculated that there were other factors besides bank health and local economy status involved in the allocation of TARP funds. Anecdotal evidence suggested that powerful politicians might have exerted their influence to help banks get TARP funds.[18] One possible channel of political influence on TARP decisions was through elected representatives. Local financial institutions could ask their elected representatives for help when they wanted federal government aid. Big banks might have access to more than one Congress member, however, for small banks, their local Representative was likely the first person they would contact.[19]

Two variables are defined in this paper to capture the political influence through the Representative channel. The first one is the percentage of campaign contributions from local FIRE industries in total contributions received by a Representative in the 2007–2008 election cycle. A larger percentage means a Representative relied more on local FIRE's support in the campaign. In turn, the Representative could push harder for the FIRE industries' interests. The second variable is a dummy that indicates if a Representative sat on the Subcommittee on Financial Institutions and Consumer Credit, which supervises all federal banking regulators. The idea

[13] A report by the Office of the Special Inspector General for TARP (SIGTARP, 2009) indicates that there was a line for TARP applicants' CAMELS ratings on the CPP decision memo template. For details, see http://www.sigtarp.gov/Audit Reports/Opportunities_to_Strengthen_Controls.pdf.

[14] Using the number of corrective orders to proxy for a bank's management quality yields similar results. Results tables are available upon request.

[15] A report by the Office of the Special Inspector General for TARP (SIGTARP) provides some evidence that the Treasury Department had "regional considerations" in making TARP decisions. For details, see http://www.sigtarp.gov/Audit Reports/Opportunities_to_Strengthen_Controls.pdf.

[16] In the robustness check section, I re-do the analyses for small banks (community banks) only and find similar results.

[17] More corporate governance requirements were imposed on TARP recipients by the American Recovery and Reinvestment Act (ARRA) passed in February 2009.

[18] For example, WSJ, January 27, 2009, "Political Interference Seen in Bank Bailout Decisions". The Washington Post, July 1, 2009, "After Call From Senator's Office, Small Hawaii Bank Got U.S. Aid."

[19] I choose not to study senators' influence on TARP decisions because senators were elected in state-wide elections and were usually not so closely tied with "local" businesses as Representatives are.

is that a Representative would be more effective in pushing federal banking regulators if he/she sat on this subcommittee. It is worth mentioning that, when these political variables are defined using prior years' data – such as in 2006–2007 – results in this paper still hold, suggesting that it is not the case that banks with strong loan demand chose to contribute more to get access to politicians right before the 2008–2009 crisis.

Besides campaign contributions and committee assignments, ideology might also have affected a Representative's action. Republicans were thought to be generally more opposed to government bailouts of private firms. To control for this ideology difference, I include in the model a Democrat dummy, which equals one if a Representative was a Democrat.

Another channel of influence was through a bank's connection to the Federal Reserve Banks. The Fed evaluated TARP applications of its member banks and all bank holding companies. A bank with some Fed-connection might have been treated more favorably in the Fed's evaluation process. Following Duchin and Sosyura (2012), a bank was assumed to be connected to the Fed if an executive at the bank served as a director of a Federal Reserve Bank (FRB) or of a branch of a FRB. Each of the 12 Federal Reserve Banks has a nine-member board. The three Class A directors, which represent the banking industry, are usually senior executives of member banks. By the Fed's rule, three Class A directors of a Federal Reserve Bank have to be from large, medium, and small-size banks, respectively.[20] So the Fed connection dummy was not skewed by bank size. Each of the 24 branches of the Federal Reserve Banks has a board of five or seven directors. They are appointed by their parent bank and the Federal Reserve Board of Governors. Usually one or two directors on a Federal Reserve Bank branch's board are bank executives.[21]

4. Data

The data used in this paper are from multiple sources. Bank data are extracted from Call Reports published on the Chicago Fed's website. All banks regulated by the Federal Reserve, FDIC, or OCC are required to file quarterly Consolidated Reports of Condition and Income (Call Reports) with their federal regulators. The Call Reports contain basic financial and geographical information for commercial banks operating in the U.S. Since the TARP was established in October 2008, and the deadline for application for most of the QFIs (except for about 625 S-corporations) was before mid-December of 2008, the 2008Q3 Call Report data is the most appropriate bank data for this study.

There were 7944 individual banks that filed 2008Q3 Call Reports. I exclude all foreign-controlled banks from the sample, as they were not eligible for TARP investments, which leaves a sample of 7599 banks.[22] Further, I exclude banks that failed or were acquired before 2009Q2, banks that could not be mapped to a congressional district, and banks with no on-balance sheet loans.[23] The final sample consists of 7062 individual banks.

CPP transactions were published on the Treasury Department's website. TARP capital injections were made between October 2008 and December 2009. I focus on the period of October 2008 to April 2009 to estimate the (short-term) stimulus effect of TARP, since starting May 2009, TARP banks repaid their TARP capital to the Treasury Department in droves.[24] As of April 24, 2009, the Treasury Department had invested in 566 institutions, totaling approximately $199 billion (91.3% of total funds). These TARP recipients included 518 banks and bank holding companies, 43 thrift holding companies, and several other types of financial companies. This paper focuses on commercial banks, since commercial banks as a group received, by far, the largest amount of TARP funds, and made the majority of loans in the economy.[25] I assume that if a bank holding company was approved for TARP, all of its subsidiary banks received some fraction of the TARP funds. I associate bank holding companies with their subsidiary banks using the Summary of Deposits (SOD) data from the FDIC. As of April 24, 2009, there were 647 individual banks that received TARP funds, either directly or through their parent companies.

It is widely acknowledged that the Treasury Department would not let giant banks fail due to the associated systemic risk. To avoid signaling that specific giant banks were weaker than others, the Treasury Department made capital injections into all of the top 8 largest U.S. banks under TARP.[26] I exclude these eight banks from the model estimation in the following sections to mitigate the concern that the Treasury Department might have different motivations when approving TARP funds for these banks.

Summary statistics of TARP and non-TARP banks are presented in Panel A of Table 1. TARP banks, on average, were more than six times larger than non-TARP banks, and earned a much lower return on assets than non-TARP banks. Non-TARP banks were better capitalized than TARP banks. Non-TARP banks had an average (median) Tier 1 ratio of 17.1% (13.4%), compared to 12.4% (10.1%) for TARP banks. Moreover, TARP banks had more troubled loans, less cash, and bigger exposure to the real estate market.

For each congressional district, I compute the percentage of workforce in the FIRE industries using 2007 congressional district-level workforce data from the Census Bureau. Census tract-level unemployment data (as of June 2008) are obtained from the Department of Housing and Urban Development. Quarterly median home prices from 2000Q1–2009Q1 for 154 Metropolitan Statistical Areas (MSAs) are obtained from the National Association of Realtors (NAR).

Each bank in the sample is mapped to one of the 435 congressional districts by the location of its headquarter. The unemployment rate in a congressional district is calculated as the mean of unemployment rates of census tracts within the district. The correspondence between MSAs and congressional districts is not 1-to-1 in general. The 154 MSAs that I have home price data for spread across 282 congressional districts in 46 states (excluding AK, VT, MT, and WY). In most cases, a congressional district overlaps with only one of the MSAs, and I take the median home price in that MSA as the median home price in the congressional district. If a congressional district overlaps with more than one MSA, the median home price in the congressional district is computed by taking the average of home prices in all MSAs that have some overlapping with the congressional district. Merging home price, workforce, and unemployment rate data with bank data, I get a sample of

[20] Six (Class A and Class B directors) of the nine members are elected by member banks. Three Class C directors are appointed by the Federal Reserve Board of Governors. Class B and Class C directors are supposed to represent the public, with representatives from manufacturing, law, agriculture, academia, and labor etc.

[21] A similar connection variable cannot be defined for the other federal banking regulators. The FDIC and OCC have different organizational structures. None of their directors or officials are current bank executives.

[22] By the Treasury Department's definition, a foreign controlled banks is a bank that was established and operating in the U.S., whose 25% or more shares are owned by foreign companies. For example, Citizens Banks is a Providence, RI bank, whose parent is RBS, a U.K. bank.

[23] There were about 250 banks that reported invalid headquarter zip codes, such as 08XXX, which could not be associated with a congressional district. I restrict the sample to banks with non-zero on-balance sheet loans to perform the second stage estimate of TARP's effect on loan supply.

[24] The main results of this paper still hold if the sample period is extended to the end of 2009.

[25] Thrifts and other financial companies have different organizational structures and regulatory framework. Their lending activities could be fundamentally different from those of banks. So I exclude thrifts and other financial companies from the sample.

[26] These eight banks are Bank of America, J.P. Morgan Chase Bank, Wells Fargo Bank, Citibank, Bank of New York Mellon, State Street, Goldman Sachs, and Morgan Stanley.

Table 1
Summary statistics. Panel A compares characteristics of TARP banks and non-TARP banks. All data are 2008Q3 Call Report data. Average values and medians (in parentheses) are reported. Panel B reports summary statistics for 435 congressional districts in the U.S. *FIRE workforce* is the percentage of workforce in the FIRE industries in each congressional district as of 2007. *Unemployment rate* is the June 2008 unemployment rate in each congressional district. *Home price change* is the percentage decline of median home prices as of 2008Q3 from home price peak in 2005–2008. *Local FIRE donation* is the percentage of campaign contributions from local FIRE industries in total contributions received by a Representative in the 2007–2008 election cycle.

	TARP banks	TARP banks (excl. top 8)	Non-TARP banks	All banks
Panel A: Summary statistics of banks				
Assets ($ bn)	9.7***	3.26***	0.47	1.32
	(0.49)***	(0.48)***	(0.12)	(0.13)
Tier 1 ratio (%)	12.4***	11.7***	17.1	16.6
	(10.1)***	(10.1)***	(13.4)	(13.0)
Change in tier 1 ratio (%)	−2.94	−3.40	−3.35	−3.31
	(−0.33)	(−0.36)	(−0.32)	(−0.32)
Troubled assets ratio (%)	14.6	14.7	14.3	14.3
	(11.8)***	(12.0)***	(7.9)	(8.3)
Age	51.2***	51.2***	70.2	68.5
	(28)***	(28)***	(81)	(78)
ROA (%)	0.10***	0.06***	0.54	0.50
	(0.50)***	(0.49)***	(0.81)	(0.78)
Loans/deposits (%)	98.0***	98.6**	83.3	84.6
	(99.2)***	(99.2)***	(85.5)	(87.0)
Cash/assets (%)	3.08***	3.05***	4.69	4.54
	(2.33)***	(2.33)***	(3.10)	(3.02)
Net charge-off ratio (%)	0.47***	0.44***	0.26	0.28
	(0.19)***	(0.19)***	(0.08)	(0.09)
Real estate loans (%)	71.28***	72.22***	62.29	63.11
	(75.66)***	(75.92)***	(67.20)	(68.18)
Non-performing loans (%)	1.56	1.56	1.72	1.71
	(1.18)**	(1.17)**	(0.96)	(0.98)
No. of banks	647	628	6415	7062

	FIRE (%)	Unemployment rate (%)	Home price change (%)	Local FIRE donation (%)
Panel B: Summary statistics of congressional districts				
Mean	6.66	5.97	−11.92	1.98
Median	6.24	5.73	−8.15	1.34
Max.	16.86	16.14	18.91	13.08
Min.	2.27	2.93	−47.36	0
Std. dev.	0.22	1.53	12.33	2.06
N	433	435	282	432

*** 1% Significance level for the difference between TARP and non-TARP banks.
** 5% Significance levels for the difference between TARP and non-TARP banks.
* 10% Significance levels for the difference between TARP and non-TARP banks.

Table 2
Correlation. This table reports correlation coefficients between local economy variables and political and regulatory variables. Panel A reports congressional district level correlation, i.e., one observation for each congressional district. Panel B reports individual bank level correlation, i.e., one observation for each bank in the sample.

	FIRE (%)	Unemployment rate (%)	Home price change (%)	Local FIRE donation (%)	Comm.	Subcomm. on FI	
Panel A: Congressional district level correlation							
FIRE (%)	1.00						
Unemployment rate (%)	−0.26	1.00					
Home price change (%)	−0.13	−0.41	1.00				
Local FIRE donation (%)	0.21	−0.19	0.09	1.00			
Comm.	0.17	−0.01	0.02	0.01	1.00		
Subcomm. on FI	0.12	−0.02	0.05	0.02	0.71	1.00	
	FIRE (%)	Unemployment rate (%)	Home price change (%)	Local FIRE donation (%)	Comm.	Subcomm. on FI	Fed director
Panel B: Individual bank level correlation							
FIRE (%)	1.00						
Unemployment rate (%)	−0.19	1.00					
Home price change (%)	−0.13	−0.33	1.00				
Local FIRE donation (%)	0.28	−0.17	0.09	1.00			
Comm.	0.09	0.06	−0.01	0.02	1.00		
Subcomm. on FI	0.14	0.09	−0.08	0.02	0.57	1.00	
Fed director	0.00	0.05	−0.02	0.02	−0.01	−0.02	1.00

5045 banks, 413 of which had received TARP funds by April 24, 2009.[27]

The House of Representatives committee assignment data are obtained from the House website. There were 71 Representatives sitting on the Financial Services Committee in 2009 (111th Congress), 45 of which were on the Subcommittee on Financial Institutions and Consumer Credit.[28] There are 926 banks in the sample that are headquartered in the committee members' districts, 344 of which were located in districts of the subcommittee members.[29]

I obtain campaign contribution data from the Center for Responsive Politics (CRP). The CRP compiles and publishes PACs and individual political contribution data for each Congress member in every two-year election cycle. The percentage of contributions from local FIRE industries (from both individuals and PACs) in the total contributions received by each Representative is calculated for the 2007–2008 election cycle.

The list of directors for each of the 12 Federal Reserve Banks – and their 24 branches – is obtained from the Fed's website. There are 54 banks in the sample that are considered to have connections to the Fed.[30]

Panel B of Table 1 provides summary statistics for the three local economy variables and local FIRE contributions. Table 2 shows the correlation between the three local economy variables and political and regulatory variables. The correlation coefficients between local economy variables and political and regulatory variables are all small, indicating that local economy variables and political and regulatory variables are not highly correlated.

5. TARP investments and bank loan supply

In this section, I empirically test if TARP investments increased credit supply in the economy. Since the Treasury Department's TARP decisions might be correlated with loan demand for banks, any observed change in loan growth rate at TARP banks could be due to both the credit supply effect of TARP and the (unserved) loan demand for banks. A two-step treatment effects model with exclusion restrictions is employed to separate the credit supply effect from the loan demand effect. The estimation results of these two steps are reported in Sections 5.1 and 5.2. Placebo tests are conducted in Section 5.3 to verify the validity of the exclusion restrictions. Section 5.4 discusses banks' usage of TARP capital implied by the increase in loan supply. Section 5.5 tries to infer the quality of loans spurred by TARP investments from the change in non-performing loans ratios at TARP banks.

5.1. TARP distribution factors

This section investigates factors that determined the TARP funds distribution to banks. As discussed in Section 3, there are three sets of candidate factors: bank characteristics, local economy status, and political and regulatory connections. I estimate a probit model of whether banks received TARP funds:

$$P(TARP = 1|X) = \Phi\left(\gamma_0 + \gamma_B' X_B + \gamma_{LE}' X_{LE} + \gamma_P' X_P\right),$$

where $X = \left(X_B' X_{LE}' X_P'\right)'$ consists of bank characteristics variables X_B, local economy variables X_{LE}, and political and regulatory variables X_P, and Φ is the cumulative distribution function of the standard normal distribution. We should expect positive coefficients on X_P, if political and regulatory connections played a role in the allocation of TARP funds.

The bank characteristics vector X_B includes proxies for CAMELS rating components (Tier 1 ratio, troubled assets ratio, age, ROA, cash-to-assets ratio, and loans-to-deposits ratio), bank size variables (log (assets) and a set of size dummies), exposure to the real estate market, and change in Tier 1 ratio from 2007Q3–2008Q3. The Tier 1 ratio squared is also included in the model to capture the non-monotonic effect of the Tier 1 ratio on TARP decisions. X_{LE} has three local economy indicators: the unemployment rate, the percentage of workforce in the FIRE industries, and the rate of home price decline. Political and regulatory factors in X_P include a dummy that indicates if a local Representative sat on the Subcommittee on Financial Institutions and Consumer Credit, the Democrat dummy, the percentage of local FIRE contributions in total contributions received by a Representative in the 2007–2008 election cycle, and the Fed connection dummy.

A big challenge to this empirical analysis is that the list of TARP applicants is unobservable. The Treasury Department made it very clear that they were not going to disclose identities of TARP applicants, possibly due to the signaling effect of TARP decisions.[31] If the probit model of TARP is estimated with all the bank data, which counterfactually assumes all banks had applied for TARP funds, the result may be biased. Conceptually, banks that chose not to apply for TARP funds can be divided into two groups. The first group of banks (over-qualified banks) could have been approved for TARP funds, if they had applied. The second group of banks (unqualified banks) would have been rejected even if they had applied. Including the second group of banks in the model estimation should not generate any bias. The potential bias of estimating the model with all banks is driven by the first group of banks. Unfortunately, given the non-transparent TARP evaluation process, it is hard to predict the direction of the bias.

There is no perfect way to solve this unobservable applicants problem. My method to deal with it is to focus on a subsample of banks, for which the unobservable applicants problem is less severe and the model estimation will be more reliable. Although TARP capital was considered to be "cheap money,"[32] many banks decided not to apply for, or take, TARP funds. A number of banks publicly announced that they chose not to apply for TARP investments. The most common reason, cited by almost all of these banks, was that they had enough capital to support their lending activities and did not need the government's help. Based on this observation, I divide banks in the sample into subsamples of banks with above median Tier 1 ratios (well-capitalized banks) and of banks with below median Tier 1 ratios (less well-capitalized banks). The unobservable applicants problem should be less severe for less well-capitalized banks. As one piece of evidence that capital-constrained banks were more likely to apply for TARP capital, 527 of 628 TARP banks in the sample had below median Tier 1 ratios. The probit model of TARP will be estimated on the full sample and on the two subsamples, respectively, but the focus will be on the subsample of less well-capitalized banks.

[27] The loss of about 2000 (30%) sample banks is mainly due to the small coverage of home price data. In robustness checks, I re-do the analyses excluding the home price change variable, and get quantitatively similar results.

[28] As robustness checks, I replace the 2009 Subcommittee on Financial Institutions dummy with a dummy for Subcommittee members in the 110th Congress (2007–2008) or the average of the 2007–2008 dummy and 2009 dummy. The results, which are not reported in this paper, are not materially changed.

[29] The numbers rise to 1173 and 520, respectively, when banks without home price data are included in the sample.

[30] The number rises to 76, when banks without home price data are included in the sample.

[31] That is, a disclosed rejection of a bank's TARP application could be viewed by the public as a de facto death sentence for the bank, which could induce a bank run.

[32] Veronesi and Zingales (2010) estimate that in the first 10 transactions of TARP the Treasury Department paid $125 billion for financial claims worth only $89–112 billion. The Congressional Oversight Panel (2009) issued an evaluation report on February 6, 2009, concluding that "... (for) all capital purchases made in 2008 under TARP, Treasury paid $254 billion, for which it received assets worth approximately $176 billion, a shortfall of $78 billion."

Table 3
TARP funds distribution factors. This table presents estimates of the probit model of the Treasury Department's TARP decisions. The dependent variable is the TARP dummy that equals 1 for banks that received TARP funds. The sample consists of banks that filed 2008Q3 Call Reports, excluding top 8 largest banks, foreign controlled banks, and banks that failed or were acquired before 2009Q2. Columns (1) and (2) report regression estimates for all banks in the sample. Columns (3) and (4) report regression estimates for banks with below median Tier 1 ratios (less well-capitalized banks). Columns (5) and (6) report regression estimates for banks with above median Tier 1 ratios (well-capitalized banks). All bank data are 2008Q3 data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses. Results of χ^2-test of the hypothesis that coefficients on three political variables and the Fed connection are jointly zero are presented in the last row.

Variables	All banks		Less well-capitalized		Well-capitalized	
	(1)	(2)	(3)	(4)	(5)	(6)
Tier 1 ratio	−0.0602***	−0.0595***	0.660*	0.712**	−0.0320**	−0.0323**
	(−3.945)	(−3.869)	(1.910)	(2.052)	(−2.138)	(−2.134)
(Tier 1 ratio)^2	0.000133***	0.000130***	−0.0391**	−0.0416**	6.74e−05**	6.82e−05**
	(4.108)	(3.983)	(−2.344)	(−2.483)	(2.105)	(2.113)
Change in tier 1 ratio	−0.000736***	−0.000722***	−0.00562	−0.00456	−0.000245	−0.000239
	(−3.345)	(−3.262)	(−0.555)	(−0.456)	(−1.001)	(−0.949)
Troubled assets ratio	−1.054***	−1.057***	−1.226***	−1.250***	−0.350	−0.321
	(−5.142)	(−5.199)	(−5.404)	(−5.494)	(−0.907)	(−0.844)
Age	−0.00379***	−0.00364***	−0.00238***	−0.00219**	−0.00698***	−0.00705***
	(−4.810)	(−4.625)	(−2.666)	(−2.426)	(−4.018)	(−4.013)
ROA	−0.0784**	−0.0796**s	−0.0439	−0.0483	−0.108***	−0.108***
	(−2.369)	(−2.454)	(−1.327)	(−1.474)	(−2.655)	(−2.625)
Loans/deposits	−3.44e−06	−3.18e−06	0.000233	0.000252	−4.57e−06	−4.41e−06
	(−0.226)	(−0.203)	(0.685)	(0.741)	(−0.292)	(−0.282)
Cash/assets	0.00102	−0.000822	−0.0138	−0.0176	0.00966	0.00910
	(0.0958)	(−0.0739)	(−0.881)	(−1.086)	(0.994)	(0.914)
Real estate loans (%)	0.00301*	0.00306*	0.00408	0.00413	0.00116	0.00149
	(1.819)	(1.861)	(1.634)	(1.643)	(0.406)	(0.515)
FIRE (%)	0.0328*	0.0170	0.0465**	0.0259	−0.00884	−0.0163
	(1.956)	(0.953)	(2.402)	(1.250)	(−0.303)	(−0.557)
Home price change	−0.00460	−0.00566	−0.000786	−0.00210	−0.0106	−0.0106
	(−1.243)	(−1.505)	(−0.197)	(−0.535)	(−1.537)	(−1.537)
Unemployment rate	0.0711**	0.0657*	0.117***	0.110***	−0.0534	−0.0531
	(2.155)	(1.958)	(3.348)	(3.097)	(−0.842)	(−0.819)
Dem.		−0.0923		−0.0616		−0.0893
		(−0.606)		(−0.329)		(−0.324)
Subcomm. on FI		0.228		0.297*		−0.0591
		(1.552)		(1.886)		(−0.203)
Local FIRE donation (%)		0.0310**		0.0357*		0.0120
		(2.213)		(1.701)		(0.487)
Fed director		0.747***		0.746***		0.864*
		(4.181)		(3.418)		(1.817)
Constant	−3.262**	−3.094**	−8.359***	−8.432***	−1.392	−1.222
	(−2.548)	(−2.461)	(−3.648)	(−3.678)	(−0.798)	(−0.718)
Observations	4967	4953	2501	2494	2444	2437
Pseudo *R*-squared	0.232	0.240	0.213	0.222	0.143	0.150
$\chi^2(4)$	–	26.67	–	20.73	–	4.13

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

Table 3 reports estimates of the probit model. For less well-capitalized banks, Column (4) in Table 3 shows that a bank was more likely to receive TARP funds if it had less troubled assets and a lower capital ratio.[33] The negative coefficient on (Tier 1 ratio)^2 implies that banks with very low Tier 1 ratios were also denied access to TARP funds, which is consistent with the Treasury Department's intent to invest in capital-constrained, but viable, banks. Local economy status mattered in the TARP funds distribution as well. Banks in areas with higher unemployment rates had a significantly higher chance of receiving TARP investments.[34]

Political and regulatory connections also played a significant role in the allocation of TARP funds. A bank had a higher probability of receiving TARP funds if its local Representative sat on the House subcommittee that oversaw federal banking regulators. If a Representative received a greater portion of his/her campaign contributions from his/her local FIRE industries, banks in his/her district would be more likely to get TARP funds as well. The ideology effect is not significant in the model; i.e., the political affiliation of Congressional representatives did not significantly impact the distribution of TARP funds. Finally, a bank had a significantly higher chance of receiving TARP funds if its executive was a director of a Federal Reserve Bank (FRB) or a branch of a FRB.

The economic significance of the coefficients is not trivial. An average bank in the less well-capitalized category had an 8.85% chance of receiving TARP funds. A one standard deviation increase in the percentage of local FIRE donation was associated with an increase of 1.20% in the likelihood of receiving TARP funds. The likelihood increased to 14.45% if a bank's local Representative sat on the Subcommittee on Financial Institutions. The probability increased to 27.05% if a bank had the Fed connection.[35]

5.2. The effect of TARP on bank loan supply

In this section, I try to quantify TARP's stimulus effect on bank loan supply. As discussed in previous sections, the non-randomness of TARP decisions could bias an OLS estimation of TARP's ef-

[33] The estimation result for all banks is similar. The result for well-capitalized banks is in stark comparison with the results for all banks and for less well-capitalized banks. Coefficients on political and regulatory variables change signs or lose significance, which may be due to that many well-capitalized banks did not apply for TARP investments.

[34] It is unclear if the government intentionally gave aid to weaker areas or not. The positive sign on unemployment rate could also be due to that there were more weak banks in those areas.

[35] See Table B-1 in Appendix B for marginal effect estimates.

fect on bank loan supply, and the direction of the bias is uncertain. I employ a two-step treatment effects model with exclusion restrictions to address this selection bias. Section 5.1 provides the first-step probit model. In this section, I estimate the second-step model of loan growth with political and regulatory variables serving as the exclusion restrictions, showing up only in the first-stage regression. The model is specified as follows (Maddala, 1983, pp. 117–122; Wooldridge, 2010, pp. 804–806):

$$\text{Loan growth} = \alpha + \beta_B' X_B + \beta_{LE}' X_{LE} + \beta_\lambda \lambda + \epsilon,$$

where λ is the inverse Mills ratio from the first-step probit model.

There are four exclusion restrictions in the treatment effects model: a dummy for the local Representative sitting on the Subcommittee on Financial Institutions, a dummy for the local Representative being a Democrat, local FIRE industries' campaign contributions to the Representative, and a Fed connection dummy. Intuitively, none of them should directly affect loan demand for a bank. Their validity will be further confirmed by placebo tests conducted in Section 5.3. The strength of these exclusion restrictions can be easily tested. I conduct a χ^2-test of the hypothesis that coefficients on the three political variables and the Fed connection dummy are jointly zero. For less well-capitalized banks, $\chi^2(4) = 20.73$, and the null hypothesis is rejected at 1% level of significance.

Two types of bank loan growth are defined in this paper. The first one is the on-balance sheet loan growth from 2008Q3–2009Q2 (scaled by 2008Q3 total assets), i.e., before and after the TARP investments.[36] *Total credit* extended to consumers and businesses is defined as the sum of (on-balance sheet) loans and (off-balance sheet) unused loan commitments. The growth rate of total credit extended from 2008Q3–2009Q2 (scaled by 2008Q3 total assets) is the second dependent variable.

Table 4 presents estimates of the treatment effects model. TARP had a significantly positive effect on loan supply for less well-capitalized banks. TARP investments in less well-capitalized banks increased the on-balance sheet loan supply by an annualized rate of 6.36%, which was both statistically and economically significant.[37] Taking off-balance sheet loan commitments into account, the growth rate of total credit extended was 7.90% higher at TARP banks than at non-TARP banks. If we assume all TARP banks were facing similar capital constraints and had similar operating strategies, so we can extend this result to all TARP banks, then this estimate suggests that TARP banks increased loan supply in the economy by $404 billion from 2008Q3–2009Q2.[38] If we exclude Wells Fargo and JPMorgan Chase (which might not be as capital-constrained) from the sample, the total increase in loan supply would be $277 billion. These numbers are of the same order of magnitude as the $500 billion drop in new credit production in 2008Q4 documented by Cornett et al. (2011).

I further investigate the stimulus effect of TARP on different types of loans by breaking down (on-balance sheet) loans into four categories: commercial and industrial (C&I) loans, consumer loans, commercial real estate loans, and residential real estate loans. I estimate the two-step treatment effects model of loan growth for each of the four types of loans. Results in Table 5 show that TARP investments significantly boosted the supply of all these major types of loans. Overall, this section documents that, for less well-capitalized banks, TARP investments increased bank loan supply by a substantial amount, and this stimulus effect was evident across all major types of loans.

Table 4
TARP's effect on bank loan supply. This table reports the second step estimates of the treatment effects model of bank loan growth and change in Tier 1 ratio for less well-capitalized banks. Less well-capitalized banks are banks with below median Tier 1 ratios in the sample. The four exclusion restrictions, *Dem.*, *Subcommittee on Financial Institutions*, *Local FIRE donation*, and *Fed director*, are not included in this step of model estimation. *Loan growth* is the increase in total loans from 2008Q3–2009Q2 scaled by total assets. *Total credit growth* is the increase in total credit extended from 2008Q3–2009Q2 scaled by total assets, where total credit extended is defined to be the sum of total loans and (off-balance sheet) unused loan commitments. Δ *Tier 1 ratio* is the change in *Tier 1 ratio* from 2007Q3 to 2008Q3. All bank data are 2008Q3 Call Report data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	Loan growth (1)	Total credit growth (2)	Δ Tier 1 ratio (3)
Tier 1 ratio	0.416	−2.542	−0.713
	(0.204)	(−0.636)	(−1.420)
(Tier 1 ratio)^2	0.00934	0.163	0.0251
	(0.0896)	(0.862)	(1.100)
Change in tier 1 ratio	−0.622***	−0.505***	0.0511***
	(−5.868)	(−3.244)	(2.962)
Troubled assets ratio	−10.61***	−13.10***	−1.836***
	(−11.05)	(−7.070)	(−6.940)
Age	−0.00321	0.0152	0.000143
	(−0.372)	(1.454)	(0.176)
ROA	0.505***	0.161	0.0665
	(2.785)	(0.279)	(1.262)
Loans/deposits	0.00436**	0.0395***	3.24e−05
	(1.982)	(16.60)	(0.110)
Cash/assets	−0.0589	−0.173	0.0128
	(−0.746)	(−1.527)	(0.916)
Real estate loans (%)	0.0146	0.00705	−0.000927
	(0.866)	(0.361)	(−0.514)
FIRE (%)	−0.0623	−0.215	−0.0471**
	(−0.353)	(−1.016)	(−2.226)
Home price change	0.0599*	0.105**	0.0101**
	(1.843)	(2.539)	(2.311)
Unemployment rate	−0.489**	−0.153	−0.0615**
	(−1.965)	(−0.510)	(−1.957)
TARP	4.766***	5.927***	1.621***
	(3.323)	(3.621)	(3.944)
Observations	2494	2494	2494

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

5.3. Placebo tests

One concern about the treatment effects model estimates is that the exclusion restrictions, i.e., the political and regulatory connections, might be correlated with loan demand in a region. If this was the case, the above-reported effect of TARP would have actually been a combination of the supply-side effect of TARP capital injections and the demand-side effect.

As a placebo test to mitigate this concern, I replace the 2008Q3 bank data with the 2006Q3 bank data, and re-estimate the two-step treatment effects model of bank loan growth. If these political and regulatory variables were uncorrelated with loan demand for banks and affecting loan growth only through the TARP channel, the TARP dummy should be insignificant when pre-TARP loan growth data are used. Regression results in Table 6 confirm this conjecture. The TARP dummy has no effect on bank loan growth from 2006Q3–2007Q2 for less well-capitalized banks, as opposed to the significantly positive effect when 2008Q3 bank data are used (Table 4). The TARP dummy remains insignificant when both 2006Q3 bank data and 2006Q3 local economy, political and regulatory variables are used.

[36] I also tried using the loan growth rate from 2008Q3–2010Q3. The estimation results are basically unchanged. I focus on the loan growth results from 2008Q3–2009Q2, since they reflect the short-term stimulus effect of TARP investments.

[37] Table 4 column (1) shows that TARP investments increased bank loan supply by 4.77% in three quarters (2008Q3–2009Q2). 6.36% = 4.77% × (4/3). The increase of 7.90% in the growth rate of total credit extended is calculated similarly.

[38] TARP investments into Goldman Sachs, Morgan Stanley, American Express, Discover and thrifts are not included in this number since these financial institutions were not commercial banks and had no meaningful loans outstanding in 2008Q3. See Section 5.4 for the calculation.

Table 5
TARP's effect on supply of different types of bank loans. This table reports the second step estimates of the treatment effects model of bank loan growth for less well-capitalized banks. Less well-capitalized banks are banks with below median Tier 1 ratios in the sample. The four exclusion restrictions, *Dem.*, *Subcommittee on Financial Institutions*, *Local FIRE donation*, and *Fed director*, are not included in this step of model estimation. Loan growth is computed by dividing loan increase from 2008Q3–2009Q2 by total assets as of 2008Q3. All bank data are 2008Q3 Call Report data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	C&I loan (1)	Commercial RE (2)	Residential RE (3)	Consumer loan (4)
Tier 1 ratio	0.154	−0.536	−0.0584	0.160
	(0.171)	(−0.518)	(−0.0518)	(1.238)
(Tier 1 ratio)^2	−0.00179	0.0395	0.00719	−0.00648
	(−0.0420)	(0.740)	(0.135)	(−1.065)
Change in tier 1 ratio	−0.141***	−0.178***	−0.200***	−0.0242***
	(−2.990)	(−4.376)	(−4.437)	(−4.108)
Troubled assets ratio	−1.510***	−4.025***	−4.462***	0.0174
	(−5.293)	(−8.085)	(−8.768)	(0.297)
Age	0.000975	−0.00256	−0.00109	9.67e−05
	(0.507)	(−0.612)	(−0.329)	(0.287)
ROA	0.123**	0.0704	0.202***	0.0188*
	(2.152)	(0.789)	(2.717)	(1.800)
Loans/deposits	0.00239***	−0.000705	0.000278	−4.30e−05
	(6.276)	(−0.567)	(0.321)	(−0.496)
Cash/assets	0.00130	−0.0234	0.0252	−0.0106**
	(0.0473)	(−0.652)	(0.892)	(−2.081)
Real estate loans (%)	0.00940	0.0104	0.00728	−0.00174**
	(1.521)	(1.520)	(1.129)	(−2.162)
FIRE (%)	−0.0398	−0.0706	0.0558	−0.000196
	(−1.144)	(−0.992)	(0.633)	(−0.0205)
Home price change	0.0119*	0.0213	0.0274**	0.000235
	(1.750)	(1.481)	(1.991)	(0.120)
Unemployment rate	−0.111*	−0.133	−0.0313	−0.0229
	(−1.807)	(−1.202)	(−0.305)	(−1.620)
TARP	0.744***	2.429***	1.790***	0.783***
	(2.594)	(3.378)	(3.498)	(11.62)
Observations	2494	2494	2494	2413

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

A second placebo test is conducted using 2001Q3 bank data (in the last recession).[39] Again, the TARP dummy has no effect on bank loan growth from 2001Q3–2002Q2 for less well-capitalized banks. Hence, these political and regulatory variables were unlikely to be correlated with banks' loan demand. The coefficients on the TARP dummy in Table 4 and Table 5 capture the stimulus effect of TARP investments on credit supply in the economy.

5.4. Implication on banks' usage of TARP capital

The dual goal of TARP was to stabilize the banking system and to promote bank lending. If TARP banks were in a perilous state and actually needed the government's support, we should expect TARP banks to keep at least part of their TARP capital to strengthen their capital base, and possibly use part of their TARP capital to support new loans.

As of 2008Q3, TARP banks in the sample with below median Tier 1 ratios (less well-capitalized TARP banks) had aggregate total assets of $2019 billion. Their aggregate risk-weighted assets were $1634 billion. Banks with below median Tier 1 ratios received a total amount of $37.9 billion in TARP investments, which was about 2.3% of their aggregate risk-weighted assets.

Table 4 shows that less well-capitalized TARP banks on average made 4.77% (of total assets) more loans from 2008Q3–2009Q2 than non-TARP banks. This implies that less well-capitalized TARP banks made $96.3 billion more loans from 2008Q3–2009Q2. For each dollar of TARP investments, less well-capitalized TARP banks made $2.54 more loans on average.[40]

The median loans-to-capital ratio for all commercial banks was about eight-to-one. If we assume TARP banks levered up their TARP capital to this ratio, they needed to employ $12 billion of their TARP capital to support the new loans. This implies that TARP banks with below median Tier 1 ratios used about one-third ($12 billion out of $37.9 billion) of their TARP capital to support new loans.

Then how did TARP banks use the remaining two-thirds of their TARP capital? Paying out part of TARP capital as dividends might not be a good choice in the economic and political environment of early 2009. TARP banks might just keep the remaining two-thirds of TARP capital on their balance sheet to strengthen their capital base. If this was the case, their Tier 1 ratios should be increased by about 1.57%.[41] Column (3) of Table 4 shows that less well-capitalized TARP banks increased their Tier 1 ratios by 1.62% more than non-TARP banks, and the difference between 1.62% and 1.57% is not statistically significant. Thus, we can conclude that less well-capitalized TARP banks employed about one-third of their TARP capital to support new loans, while keeping about two-thirds of their TARP capital to strengthen their capital base.

5.5. Changes in non-performing loans after TARP

There are many studies on foreign markets (e.g. La Porta and Lopez-de-Silanes, 1999; Sapienza, 2004; Berger et al., 2005) documenting that government-supported banks are more likely to make low quality loans. Results in Section 5.2 show that TARP banks made significantly more loans after receiving capital injections. A natural follow-up question is then, did these new loans, spurred by TARP investments, have lower quality relative to non-TARP banks' loans?

The quality of these new loans was not directly observable. One (indirect) way to assess this problem is to examine the change in

[39] One concern about the first placebo test is that the U.S. economy was still expanding in 2006Q3, which might generate some underlying differences from the recession period of 2008Q3.

[40] $96.3 billion = 4.77%*$2019 billion. $2.54 = $96.3 billion/$37.9 billion.

[41] 1.57% = 2.30% − 12/1634.

Table 6
Placebo tests. This table reports the first and second stage estimates of the treatment effects model of bank loan growth for less well-capitalized banks. Bank data used here are 2006Q3 and 2001Q3 Call Report data. Local economy and political and regulatory variables are the same as in Table 4. Less well-capitalized banks are banks with below median Tier 1 ratios in the sample. The four exclusion restrictions, *Dem.*, *Subcommittee on Financial Institutions*, *Local FIRE donation*, and *Fed director*, are not included in the second stage of model estimation. *Loan growth* is the increase in total loans from 2006Q3–2007Q2 or 2001Q3–2002Q2 scaled by total assets. *Total credit growth* is the increase in total credit extended from 2006Q3–2007Q2 or 2001Q3–2002Q2 scaled by total assets, where total credit extended is defined to be the sum of total loans and (off-balance sheet) unused loan commitments. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	06Q3 bank data			01Q3 bank data		
	Loan growth	Credit growth	TARP	Loan growth	Credit growth	TARP
Tier 1 ratio	1.122	4.400	0.897**	−2.604	−5.211	0.285
	(0.399)	(0.984)	(2.425)	(−0.692)	(−1.170)	(0.932)
(Tier 1 ratio)^2	−0.0601	−0.201	−0.0464***	0.0973	0.213	−0.0144
	(−0.479)	(−0.994)	(−2.722)	(0.574)	(1.062)	(−1.028)
Troubled assets ratio	−19.95***	−40.76***	−1.384**	−26.50***	−31.27***	−0.190
	(−6.321)	(−3.817)	(−2.061)	(−5.870)	(−6.703)	(−0.330)
Age	−0.0407***	−0.0696***	−0.00155*	−0.0397***	−0.0407***	−0.00207**
	(−4.964)	(−5.074)	(−1.855)	(−5.107)	(−4.337)	(−2.226)
ROA	−0.346	−4.725	−0.308***	−0.155	0.938	−0.123**
	(−0.917)	(−1.226)	(−4.768)	(−0.293)	(1.086)	(−2.372)
Loans/deposits	0.000451***	0.00364***	0.000290*	0.000275***	−0.00218	−0.000122*
	(11.89)	(28.24)	(1.787)	(4.287)	(−0.973)	(−1.915)
Cash/assets	0.0929	−0.612***sa	0.00465	0.0157	−0.177**	0.0128
	(0.392)	(−3.168)	(0.314)	(0.147)	(−2.182)	(1.156)
Real estate loans (%)	−0.0612***	−0.187***	−0.00138	−0.0720***	−0.0661***	0.000468
	(−3.094)	(−4.229)	(−0.479)	(−4.414)	(−2.807)	(0.204)
FIRE (%)	−0.0682	0.272	0.0171	−0.212	−0.0623	−0.00735
	(−0.511)	(1.054)	(0.717)	(−1.259)	(−0.285)	(−0.360)
Home price change	0.0232	−0.0340	0.00100	−0.121***	−0.152***	0.00120
	(0.923)	(−0.745)	(0.232)	(−3.745)	(−4.229)	(0.327)
Unemployment rate	−0.378	−0.371	0.100***	−0.280	−0.00787	0.0644*
	(−1.491)	(−0.884)	(2.672)	(−1.089)	(−0.0248)	(1.899)
Dem.			−0.241			−0.226
			(−1.361)			(−1.414)
Subcomm. on FI			0.283*			0.340**
			(1.797)			(2.275)
Local FIRE donation (%)			0.0204			0.0323*
			(1.059)			(1.795)
Fed director			0.651***			1.105***
			(3.082)			(5.000)
TARP	1.582	−0.572		−0.416	0.345	
	(1.292)	(−0.199)		(−0.368)	(0.249)	
Observations	2591	2591	2591	2744	2744	2744

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

non-performing loan ratios (percentage of non-performing loans in total loans) in the two years after TARP investments. If the new loans, spurred by TARP investments, were of significantly lower quality and started to turn non-performing within the two years of origination, we should observe a jump in the non-performing loan ratios at TARP banks.

I estimate a two-step treatment effects model of the change in the non-performing loan ratios from 2008Q3–2010Q3 with political and regulatory connections as the exclusion restrictions. Table 7 reports the estimation results. The increase in non-performing loan ratios was not higher for TARP banks than for non-TARP banks. In fact, the non-performing loan ratios at TARP banks decreased relative to non-TARP banks for C&I loans and real estate loans. These results are not driven by TARP banks charging off non-performing loans more aggressively. The results still hold when loan charge-offs in 2008Q4–2009Q2 are added back to the non-performing loans.

6. Robustness checks

In this section, I conduct several robustness checks to make sure the results are not driven by other potential confounding factors.

6.1. Demand-side effect?

Besides the supply-side effect proposed in this paper, there are alternative explanations for the observed correlation between TARP investments and bank loan growth. For example, it could be that banks with high expected loan demand were more likely to apply for TARP funds, or that the government was more likely to approve applications by banks with high loan demand.

To alleviate concerns in this direction, I re-estimate the two-step treatment effects model on subsamples of banks that were likely to have high loan demand. If the effect of TARP on loan growth is still as significant, the supply-side story proposed in this paper is more likely to be true. I further restrict the estimation subsample (less well-capitalized banks) to banks with above-median unused loan commitments-to-assets ratio, banks with above-median loan growth from 2007Q3–2008Q3, banks in regions with below-median home price decline, or banks in regions with below-median unemployment rate. The estimation results are presented in Table 8. As expected, the effect of TARP on loan growth is still significantly positive.

6.2. Choice of instruments

A potential concern about the Subcommittee on Financial Institutions dummy as an exclusion restriction is that Representatives might self-select to be seated on this subcommittee to benefit their constituencies. To address this concern, I include the Subcommittee on Financial Institutions dummy in the second-step regression, using only local FIRE donation, the Democrat dummy, and the Fed connection dummy as the exclusion restrictions, and re-estimate the model. Results reported in Table 9 are similar to those in Tables

Table 7
TARP's effect on loan quality: change in non-performing loans. This table reports the second stage estimates of the treatment effects model of change in the non-performing loan ratio for less well-capitalized banks. Less well-capitalized banks are banks with below median Tier 1 ratios in the sample. The dependent variable is the change in the ratio of non-performing loans to loans from 2008Q3–2010Q3. The four exclusion restrictions, *Dem.*, *Subcommittee on Financial Institutions*, *Local FIRE donation*, and *Fed director*, are not included in this step of model estimation. All bank data are 2008Q3 Call Report data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	All (1)	C&I (2)	Comm. RE (3)	Resi. RE (4)	Consumer (5)
Tier 1 ratio	0.829	−0.415	0.774	1.449	1.450*
	(0.705)	(−0.270)	(0.445)	(0.592)	(1.801)
(Tier 1 ratio)^2	−0.0477	0.00939	−0.0548	−0.0829	−0.0742*
	(−0.886)	(0.132)	(−0.678)	(−0.735)	(−1.950)
Change in tier 1 ratio	0.0120	−0.00655	0.0471	−0.0155	0.0282
	(0.567)	(−0.268)	(1.218)	(−0.328)	(1.486)
Troubled assets ratio	−0.580	0.343	−2.072*	−2.725**	−0.635
	(−0.856)	(0.331)	(−1.825)	(−2.554)	(−1.094)
Age	−0.00972***	−0.00737***	−0.0125***	−0.0114***	−0.00169
	(−6.206)	(−3.247)	(−4.646)	(−3.221)	(−0.968)
ROA	−0.000356	0.150*	−0.0744	0.201	−0.0500
	(−0.00565)	(1.943)	(−0.667)	(0.620)	(−0.830)
Loans/deposits	0.000514	0.00519***	−0.00214	0.00246*	−0.00804
	(0.465)	(4.315)	(−1.175)	(1.836)	(−1.216)
Cash/assets	−0.0584***	−0.0551*	−0.104**	−0.0144	0.0104
	(−2.756)	(−1.807)	(−2.016)	(−0.304)	(0.429)
Real estate loans (%)	0.0309***	0.0131**	0.0338***	0.0304**	0.00367
	(7.786)	(2.253)	(4.382)	(2.549)	(0.884)
FIRE (%)	0.104**	0.0883*	0.194*	0.0764	0.0656*
	(2.271)	(1.889)	(2.727)	(0.954)	(2.414)
Home price change	−0.0261***	−0.0356***	−0.0285*	−0.0142	−0.00933
	(−2.659)	(−3.110)	(−1.671)	(−0.821)	(−1.045)
Unemployment rate	−0.0835	−0.0986	−0.0514	0.0185	0.0769*
	(−1.202)	(−1.469)	(−0.398)	(0.135)	(1.825)
TARP	−0.170	−1.447***	−3.253***	−3.785*	0.0775
	(−0.486)	(−3.268)	(−3.244)	(−1.694)	(0.237)
Observations	2305	2294	2298	2302	2294

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

Table 8
Robustness check: demand side effect? This table reports the second stage estimates of the treatment effects model of bank loan growth for less well-capitalized banks with above-median unused loan commitments-to-assets ratios, with above-median 2007Q3–2008Q3 loan growth rates, in regions with below-median home price declines, or in regions with below-median unemployment rates, respectively. Less well-capitalized banks are banks with below median Tier 1 ratios in the sample. The four exclusion restrictions, *Dem.*, *Subcommittee on Financial Institutions*, *Local FIRE donation*, and *Fed director*, are not included in this step of model estimation. *Loan growth* is the increase in total loans from 2008Q3–2009Q2 scaled by total assets. All bank data are 2008Q3 Call Report data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	Above-median unused loan comm.	Above-median lagged loan growth	Below-median home price decline	Below-median unempl. rate
Tier 1 ratio	−0.123	1.854	0.852	−0.907
	(−0.0306)	(0.711)	(0.163)	(−0.148)
(Tier 1 ratio)^2	0.0522	−0.0469	−0.0200	0.0821
	(0.257)	(−0.344)	(−0.0789)	(0.269)
Change in tier 1 ratio	−0.613***	−0.551***	−0.486***	−0.432***
	(−5.405)	(−4.907)	(−4.081)	(−3.976)
Troubled assets ratio	−13.74***	−13.08***	−10.31***	−11.40***s
	(−10.14)	(−6.780)	(−4.787)	(−6.310)
Age	−0.00181	−0.0164*	0.0180	−0.0130
	(−0.152)	(−1.758)	(1.144)	(−0.892)
ROA	0.451*	0.125	0.800	0.514
	(2.154)	(0.382)	(1.351)	(1.327)
Loans/deposits	0.00436*	0.00216	0.0416*	0.00454**
	(1.927)	(1.582)	(1.654)	(2.131)
Cash/assets	−0.144	−0.0913	−0.0223	−0.0976
	(−1.056)	(−1.073)	(−0.219)	(−0.783)
Real estate loans (%)	0.0288	−0.0164	0.0319	0.00213
	(1.231)	(−0.805)	(1.151)	(0.0796)
FIRE (%)	0.00470	0.0362	−0.184	−0.00980
	(0.0202)	(0.162)	(−1.011)	(−0.0431)
Home price change	0.0574	0.0640	0.0122	0.182**
	(1.479)	(1.617)	(0.120)	(2.125)
Unemployment rate	−0.548*	−0.348	−0.357	1.477
	(−1.724)	(−1.072)	(−1.084)	(1.538)
TARP	4.787***	2.983*	5.927**	6.493**
	(2.686)	(1.731)	(2.189)	(2.085)
Observations	1662	1470	1152	1170

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

Table 9
Robustness check: Subcommittee on Financial Institutions not an exclusion restriction. This table reports the second stage estimates of the treatment effects model of loan growth for less well-capitalized banks, where the *Subcomm. on FI* dummy is not used as an exclusion restriction. Less well-capitalized banks are banks with below median Tier 1 ratio in the sample. The three exclusion restrictions, *Dem.*, *Local FIRE donation*, and *Fed director*, are not included in this step of model estimation. *Loan growth* is the increase in total loans from 2008Q3–2009Q2 scaled by total assets. *Total credit growth* is the increase in total credit extended from 2008Q3–2009Q2 scaled by total assets, where total credit extended is defined to be the sum of total loans and (off-balance sheet) unused loan commitments. All bank data are 2008Q3 Call Report data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	Loan growth (1)	Credit growth (2)
Tier 1 ratio	0.459	−2.510
	(0.225)	(−0.628)
(Tier 1 ratio)^2	0.00707	0.161
	(0.0677)	(0.852)
Change in tier 1 ratio	−0.621***	−0.505***
	(−5.708)	(−3.186)
Troubled assets ratio	−10.68***	−13.15***
	(−11.15)	(−7.109)
Age	−0.00309	0.0153
	(−0.360)	(1.466)
ROA	0.508***	0.164
	(2.812)	(0.284)
Loans/deposits	0.00446**	0.0396***
	(2.023)	(16.68)
Cash/assets	−0.0631	−0.176
	(−0.801)	(−1.555)
Real estate loans (%)	0.0136	0.00627
	(0.808)	(0.321)
FIRE (%)	−0.116	−0.255
	(−0.664)	(−1.228)
Home price change	0.0585*	0.104***
	(1.853)	(2.553)
Unemployment rate	−0.526***	−0.180
	(−2.123)	(−0.604)
Subcomm. on FI	2.089	1.550
	(1.598)	(0.937)
TARP	4.593***	5.794***
	(3.061)	(3.433)
Observations	2494	2494

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

3 and 4. The effect of TARP on bank loan supply is not driven by the Subcommittee on Financial Institutions dummy.

6.3. Home price change

Home price data from the NAR cover only about 5000 banks of the approximately 7000 banks with Call Report data. Including the home price change variable in regressions effectively excludes about 2000 banks from the sample. Since this exclusion of banks is non-trivial, it could materially change the model estimates. As a robustness check, I exclude the home price change variable from regressions, and re-estimate the two-step treatment effects model for all of the approximately 7000 banks. Table 10 presents the results, which are not substantially different from estimates in Section 5.2.

6.4. Regulator fixed effects

The three federal banking regulators, the Fed, FDIC, and OCC, supervise different types of commercial banks. These regulators' evaluation processes for TARP applications could also be different. To control for this source of variation, I add the regulator fixed effects dummies into the model, and the (unreported) results are roughly unchanged.

Table 10
Robustness check: home price change variable excluded. This table reports the first and second stage estimates of the treatment effects model of loan growth for less well-capitalized banks, where the home price change variable is excluded from regressions. Less well-capitalized banks are banks with below median Tier 1 ratios in the sample. The four exclusion restrictions, *Dem.*, *Subcommittee on Financial Institutions*, *Local FIRE donation*, and *Fed director*, are not included in this step of model estimation. *Loan growth* is the increase in total loans from 2008Q3–2009Q2 scaled by total assets. *Total credit growth* is the increase in total credit extended from 2008Q3–2009Q2 scaled by total assets, where total credit extended is defined to be the sum of total loans and (off-balance sheet) unused loan commitments. All bank data are 2008Q3 Call Report data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	Loan growth (1)	Credit growth (2)	TARP (3)
Tier 1 ratio	−0.833	−2.744	0.579**
	(−0.516)	(−0.990)	(2.162)
(Tier 1 ratio)^2	0.0589	0.163	−0.0348***
	(0.732)	(1.247)	(−2.697)
Change in tier 1 ratio	−0.647***	−0.561***	−0.000850
	(−6.357)	(−4.111)	(−0.0907)
Troubled assets ratio	−10.74***	−13.17***	−1.568***
	(−13.11)	(−9.389)	(−7.906)
Age	−0.00268	0.0150*	−0.00350***
	(−0.399)	(1.826)	(−4.655)
ROA	0.670***	0.480	−0.0696**
	(4.104)	(1.057)	(−2.323)
Loans/deposits	0.00446*	0.0363***	0.000178
	(1.777)	(8.277)	(0.484)
Cash/assets	−0.00940	−0.0502	−0.0363***
	(−0.140)	(−0.555)	(−2.673)
Real estate loans (%)	0.0145	−0.000398	0.00320
	(1.118)	(−0.0264)	(1.567)
FIRE (%)	0.0246	−0.149	0.0194
	(0.195)	(−0.978)	(1.281)
Unemployment rate	−0.345**	−0.168	0.0803***
	(−2.082)	(−0.874)	(3.129)
Dem.			0.0300
			(0.192)
Subcomm. on FI			0.313**
			(2.279)
Local FIRE donation (%)			0.0122
			(0.646)
Fed director			0.641***
			(3.600)
TARP	4.152***	5.490***	
	(4.358)	(4.987)	
Observations	3487	3487	3487

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

6.5. Small banks

Large banks operating across congressional districts might have access to more than one Representatives. The association of banks to congressional districts by the location of their headquarters might not capture banks' actual connections with politicians. Similarly, the home price change and the unemployment rate in a bank's headquarter district could be quite different from those of a distant district where the bank also conduct business. However, for small banks operating in regions around their headquarters, the association and local economy variables were more pertinent. I expect a more accurately-estimated effect of TARP investments on loan supply for small banks. I restrict the sample to small banks, defined as banks with less than $1 billion in assets, and estimate the two-step treatment effects model. Table 11 presents the results of the two-step estimation. The effect of TARP investments on bank loan supply was stronger for less well-capitalized banks in the small bank subsample than in the full sample. TARP investments in less well-capitalized banks increased the on-balance sheet loan supply by an annualized rate of 7.83%, compared with 6.36% for less well-capitalized banks in the full sample.

Table 11
TARP's effect on bank loan supply: small banks. This table reports the second stage estimates of the treatment effects model of loan growth for small banks in the less well-capitalized category. Small banks are banks with <$1bn in assets. Less well-capitalized banks are banks with below median Tier 1 ratios in the sample. The four exclusion restrictions, *Dem.*, *Subcommittee on Financial Institutions*, *Local FIRE donation*, and *Fed director*, are not included in this step of model estimation. *Loan growth* is the increase in total loans from 2008Q3–2009Q2 scaled by total assets. *Total credit growth* is the increase in total credit extended from 2008Q3–2009Q2 scaled by total assets, where total credit extended is defined to be the sum of total loans and (off-balance sheet) unused loan commitments. All bank data are 2008Q3 Call Report data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	Loan growth (1)	Credit growth (2)	C&I loan (3)	Commercial RE (4)	Residential RE (5)	Consumer loan (6)
Tier 1 ratio	0.448	1.005	0.145	−0.563	0.181	0.192
	(0.193)	(0.333)	(0.141)	(−0.475)	(0.143)	(1.407)
(Tier 1 ratio)^2	0.0109	0.00910	−0.000235	0.0417	−0.00230	−0.00806
	(0.0931)	(0.0613)	(−0.00486)	(0.691)	(−0.0388)	(−1.259)
Change in tier 1 ratio	−0.622***	−0.484***	−0.138***	−0.172***	−0.201***	−0.0254***
	(−5.788)	(−3.082)	(−2.835)	(−4.312)	(−4.391)	(−4.262)
Troubled assets ratio	−10.28***	−13.57***	−1.561***	−3.829***	−4.415***	0.0551
	(−9.783)	(−5.777)	(−4.987)	(−7.005)	(−8.076)	(0.920)
Age	−0.000810	0.0173	0.000809	−0.00231	−0.00104	−2.04e−05
	(−0.0833)	(1.433)	(0.371)	(−0.486)	(−0.275)	(−0.0557)
ROA	0.481**	−0.183	0.0929	0.0389	0.195**	0.0329***
	(2.136)	(−0.241)	(1.276)	(0.325)	(2.259)	(2.586)
Loans/deposits	0.00452**	0.0402***	0.00242***	−0.000673	0.000563	−3.38e−05
	(2.005)	(18.56)	(6.172)	(−0.529)	(0.511)	(−0.418)
Cash/assets	−0.0492	−0.0730	0.00338	−0.0221	0.0284	−0.0105**
	(−0.620)	(−0.757)	(0.118)	(−0.597)	(0.965)	(−2.005)
Real estate loans (%)	0.0199	−0.00239	0.00770	0.00955	0.00728	−0.0017*
	(1.183)	(−0.107)	(1.100)	(1.258)	(1.030)	(−1.944)
FIRE (%)	−0.106	−0.186	−0.0447	−0.0813	0.0517	−0.000584
	(−0.567)	(−0.864)	(−1.214)	(−1.106)	(0.536)	(−0.0600)
Home price change	0.0693**	0.102**	0.0141*	0.0246	0.0296**	0.000112
	(2.003)	(2.438)	(1.939)	(1.562)	(2.020)	(0.0540)
Unemployment rate	−0.409	−0.137	−0.108	−0.119	0.0145	−0.0242*
	(−1.503)	(−0.438)	(−1.614)	(−1.018)	(0.131)	(−1.712)
TARP	5.873***	6.286***	0.870**	2.808***	1.948***	0.827***
	(3.227)	(2.953)	(2.126)	(2.840)	(3.210)	(12.32)
Observations	2239	2239	2239	2239	2239	2170

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

6.6. Bank mergers and acquisitions (M&As)

After a bank M&A, the loan portfolio of the acquiring bank will be increased by that of the target bank. If the higher loan growth rates at TARP banks were mainly driven by M&As conducted by TARP banks, then the effect of TARP on *new* credit supply might not be significant. I obtain all bank M&A deals completed between September 30, 2008 and June 30, 2009 from Bloomberg, and re-run the regressions excluding those banks involved in M&As from the sample. The estimated TARP effect on bank loan supply is almost unchanged.

7. Conclusion

The Troubled Asset Relief Program (TARP) was the largest government rescue program in U.S. history in terms of the funds appropriated. The goals of the central piece of TARP, the Capital Purchase Program (CPP), were to strengthen the capital base of economically sound but financially distressed banks and to promote bank lending. Since its inception, there have been a lot of controversies around the effectiveness of TARP. As a first step in evaluating the effect of TARP on the economy, this paper tries to quantify the stimulus effect of TARP capital injections on credit supply in the economy.

The main empirical challenge to quantify the stimulus effect of TARP is to separate the supply-side (stimulus) effect of TARP from the demand-side effect, as TARP capital injections might have been correlated with loan demand for banks. A treatment effects model with exclusion restrictions is employed to identify the supply-side effect of TARP. Using banks' political and regulatory connections as exclusion restrictions, this paper finds that TARP significantly increased bank loan supply during the period of 2008Q3–2009Q2. For banks with below median Tier 1 ratios, TARP investments increased their loan supply by an annualized rate of 6.36%, which can be translated to $2.54 more loans for each dollar of TARP investments. This increase in loan supply was found in all major types of loans, and was not driven by firms drawing down pre-existing credit lines with TARP banks. If we extend the loan supply result to all TARP banks, the increase in loan supply can be translated into $404 billion more loans during 2008Q3–2009Q2, which is of the same order of magnitude as the $500 billion drop in new credit production in 2008Q4 documented in Cornett et al. (2011).

The 6.36% increase in loan supply suggests that TARP banks employed about one-third of their TARP capital to support new loans. The treatment effects model estimation also finds that TARP banks kept about two-thirds of TARP capital on their balance sheet as additional capital buffer. In contrast to studies on government-supported banks in foreign markets, this paper finds little evidence that TARP banks made loans of significantly lower quality relative to non-TARP banks.

Overall, this paper documents a positive stimulus effect of TARP on credit supply in the economy. Although TARP was a unique, one-time government rescue program in response to the deepest financial crisis since the Great Depression, lessons from TARP should be taken into consideration when governments initiate the next rescue programs. Results in this paper can serve as benchmarks for evaluating the effect of future financial crisis response programs in the U.S. or other parts of the world.

Appendix A. Definition of variables

- *TARP* equals 1 if a bank was a TARP recipient.
- *Loan growth* is the increase in on-balance sheet loans from 2008Q3–2009Q2 scaled by 2008Q3 total assets.

- *Total credit growth* is the increase in total credit extended to consumers and businesses from 2008Q3–2009Q2 scaled by 2008Q3 total assets, where total credit extended to consumers and businesses is defined to be the sum of on-balance sheet loans and (off-balance sheet) unused loan commitments.

Bank variables:

- *Log (assets)* = log (assets).
- *Troubled assets ratio* = (loans past due 90 days or more + non-accrual loans + other real estate owned)/(Tier 1 capital + loan loss reserve).
- *Tier 1 ratio* is the ratio of Tier 1 capital to risk-weighted assets.
- *Change in Tier 1 ratio* is the (absolute) change in *Tier 1 ratio* from 2007Q3 to 2008Q3.
- *Age* is the number of years that a bank had been in existence as of 2009.
- *ROA* is the annualized return on assets.
- *Loans/deposits* is the ratio of loans to deposits.
- *Cash/assets* is the ratio of cash to assets.
- *Net Charge-off ratio* is the charge-off against loan loss allowance net of loan recoveries scaled by total loans.
- *Real estate loans (%)* is the percentage of real estate loans in a bank's loan portfolio.
- *Non-performing loans (%)* = (loans past due 90 days or more + non-accrual loans)/loans.

Local economy variables:

- *FIRE workforce* is the percentage of workforce in the FIRE industries in a congressional district as of 2007.
- *Unemployment rate* is the June 2008 unemployment rate in a congressional district.
- *Home price change* is the percentage decline of the median home price as of 2008Q3 from home price peak in 2005–2008.

Political and regulatory variables:

- *Dem.* is 1 if a bank's local Representative was a Democrat.
- *Subcomm. on FI* is 1 if a bank's local Representative sat on the Subcommittee on Financial Institutions and Consumer Credit in the Financial Services Committee.
- *Local FIRE donation* is the percentage of campaign contributions from local FIRE industries in total contributions received by a Representative in the 2007–2008 election cycle.
- *Fed director* equals 1 if a bank's executive sat on the board of directors of a Federal Reserve Bank (FRB) or a branch of a FRB.

Appendix B. Supplemental tables

Tables B-1 and B-2.

Table B-1
TARP funds distribution factors (marginal effect). This table presents the marginal effect estimates of the probit model of the Treasury Department's TARP decisions. The dependent variable is the TARP dummy that equals 1 for banks that received TARP funds. The sample consists of banks that filed 2008Q3 Call Reports, excluding top 8 largest banks, foreign controlled banks, and banks that failed or were acquired before 2009Q2. Columns (1) and (2) report regression estimates for all banks in the sample. Columns (3) and (4) report regression estimates for banks with below median Tier 1 ratios (less well-capitalized banks). Columns (5) and (6) report regression estimates for banks with above median Tier 1 ratios (well-capitalized banks). All bank data are 2008Q3 data. *Log(assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	All banks		Less well-capitalized		Well-capitalized	
	(1)	(2)	(3)	(4)	(5)	(6)
Tier 1 ratio	−0.00533***	−0.00521***	0.107*	0.114**	−0.00120**	−0.00119**
	(−4.805)	(−4.718)	(1.901)	(2.044)	(−2.303)	(−2.318)
(Tier 1 ratio)^2	1.17e−05***	1.14e−05***	−0.00634**	−0.00666**	2.53e−06**	2.52e−06**
	(5.065)	(4.900)	(−2.334)	(−2.473)	(2.264)	(2.293)
Change in tier 1 ratio	−6.50e−05***	−6.33e−05***	−0.000912	−0.000731	−9.21e−06	−8.81e−06
	(−3.730)	(−3.633)	(−0.556)	(−0.457)	(−1.020)	(−0.970)
Troubled assets ratio	−0.0932***	−0.0926***	−0.199***	−0.200***	−0.0132	−0.0118
	(−5.029)	(−5.104)	(−5.485)	(−5.561)	(−0.926)	(−0.863)
Age	−0.000335***	−0.000319***	−0.000387***	−0.000351**	−0.000263***	−0.000260***
	(−4.380)	(−4.234)	(−2.617)	(−2.411)	(−4.101)	(−4.034)
ROA	−0.00693**	−0.00698**	−0.00712	−0.00774	−0.00405***	−0.00398***
	(−2.338)	(−2.428)	(−1.312)	(−1.458)	(−2.937)	(−2.926)
Loans/deposits	−3.04e−07	−2.79e−07	3.79e−05	4.04e−05	−1.72e−07	−1.63e−07
	(−0.225)	(−0.203)	(0.688)	(0.744)	(−0.293)	(−0.282)
Cash/assets	9.06e−05	−7.20e−05	−0.00224	−0.00281	0.000363	0.000336
	(0.0959)	(−0.0739)	(−0.870)	(−1.072)	(1.005)	(0.923)
Real estate loans (%)	0.000267*	0.000268*	0.000663*	0.000663*	4.38e−05	5.50e−05
	(1.817)	(1.858)	(1.669)	(1.683)	(0.396)	(0.498)
FIRE (%)	0.00290**	0.00149	0.00756**	0.00415	−0.000333	−0.000602
	(1.978)	(0.956)	(2.453)	(1.270)	(−0.301)	(−0.548)
Home price change	−0.000407	−0.000496	−0.000128	−0.000336	−0.000398	−0.000391
	(−1.207)	(−1.457)	(−0.197)	(−0.534)	(−1.411)	(−1.412)
Unemployment rate	0.00629**	0.00576*	0.0190***	0.0176***	−0.00201	−0.00196
	(2.185)	(1.960)	(3.509)	(3.214)	(−0.840)	(−0.823)
Dem.		−0.00754		−0.00952		−0.00303
		(−0.646)		(−0.341)		(−0.350)
Subcomm. on FI		0.0236		0.0560		−0.00206
		(1.318)		(1.639)		(−0.215)
Local FIRE donation (%)		0.00272**		0.00573*		0.000443
		(2.198)		(1.668)		(0.483)
Fed director		0.118***		0.182**		0.0785
		(2.785)		(2.565)		(1.003)
Observations	4967	4953	2501	2494	2444	2437
Pseudo *R*-squared	0.232	0.240	0.213	0.222	0.143	0.150

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

Table B-2
TARP's effect on bank loan supply: all banks. This table reports the second step estimates of the treatment effects model of bank loan growth and change in Tier 1 ratio for all banks. The four exclusion restrictions, *Dem.*, *Subcommittee on Financial Institutions*, *Local FIRE donation*, and *Fed director* are not included in this step of model estimation. *Loan growth* is the increase in total loans from 2008Q3–2009Q2 scaled by total assets. *Total credit growth* is the increase in total credit extended from 2008Q3–2009Q2 scaled by total assets, where total credit extended is defined to be the sum of total loans and (off-balance sheet) unused loan commitments. Δ*Tier 1 ratio* is the change in *Tier 1 ratio* from 2007Q3 to 2008Q3. All bank data are 2008Q3 Call Report data. *Log (assets)* and size dummies for banks with total assets <$100m, $100–300m, $300–500m, $500m-1bn, $1–3bn, $3–10bn, and >$10bn are also included in the regression, whose coefficients are not reported. *z*-statistics clustered at congressional district level are reported in parentheses.

Variables	Loan growth (1)	Credit growth (2)	Δ Tier 1 ratio (3)
Tier 1 ratio	0.124***	0.108*	−0.113**
	(2.835)	(1.653)	(−2.121)
(Tier 1 ratio)^2	−0.000301***	−0.000278*	0.000218**
	(−2.956)	(−1.898)	(2.295)
Change in tier 1 ratio	−0.00446	−0.00633	0.00239
	(−0.591)	(−0.719)	(0.735)
Troubled assets ratio	−16.63***	−19.43***	0.337
	(−14.13)	(−11.33)	(0.385)
Age	−0.0305***	−0.0129*	0.00683***
	(−4.416)	(−1.734)	(3.075)
ROA	−0.987***	−1.291**	0.675***
	(−3.037)	(−2.324)	(2.836)
Loans/deposits	−0.00146***	−0.00228***	0.00487***
	(−28.68)	(−15.59)	(202.3)
Cash/assets	−0.0614*	−0.0695	0.0224
	(−1.767)	(−1.572)	(1.109)
Real estate loans (%)	0.0268*	0.0308**	−0.00695
	(1.646)	(1.976)	(−1.392)
FIRE (%)	0.0135	−0.0703	−0.0412
	(0.104)	(−0.481)	(−1.013)
Home price change	0.0207	0.0599*	0.0108
	(0.942)	(1.820)	(1.036)
Unemployment rate	−0.451***	−0.109	0.0345
	(−2.948)	(−0.561)	(0.602)
TARP	3.871**	3.458**	5.211***
	(2.267)	(1.964)	(3.136)
Observations	4942	4942	4942

***, **, and * indicate 1%, 5%, and 10% significance levels of coefficients, respectively.

References

Ashcraft, A.B., 2005. Are banks really special? New evidence from the FDIC-induced failure of healthy banks. American Economic Review 95 (5), 1712–1730.

Bayazitova, D., Shivdasani, A., 2012. Assessing TARP. Review of Financial Studies 25 (2), 377–407.

Berger, A.N., Clark, G.R.G., Cull, R., Klapper, L., Udell, G.F., 2005. Corporate governance and bank performance: a joint analysis of the static, selection, and dynamic effects of domestic, foreign, and state ownership. Journal of Banking and Finance 29 (8–9), 2179–2221.

Bernanke, B.S., Lown, C.S., 1991. The credit crunch. Brookings Papers on Economic Activity 1991 (2), 205–247.

Black, L., Hazelwood, L., ack and Hazelwood, forthcoming. The effect of TARP on bank risk-taking. Journal of Financial Stability, forthcoming.

Brown, C., Dinc, I.S., 2005. The politics of bank failures: evidence from emerging markets. Quarterly Journal of Economics 120 (4), 1413–1444.

Claessens, S., Feijen, E., Laevena, L., 2008. Political connections and preferential access to finance: the role of campaign contributions. Journal of Financial Economics 88 (3), 554–580.

Congressional Oversight Panel, February 6, 2009. Valuing Treasury's Acquisitions. February oversight report to the Congress.

Cornett, M., McNutt, J. Strahan, P., Tehranian, H., 2011. Liquidity risk management and credit supply in the financial crisis. Journal of Financial Economics 101 (2), 297–312.

Dell'Ariccia, G., Detragiache, E., Rajan, R., 2008. The real effect of banking crises. Journal of Financial Intermediation 17 (1), 89–112.

Dinc, S., 2005. Politicians and banks: political influences on government-owned banks in emerging countries. Journal of Financial Economics 77 (2), 453–470.

Duchin, R., Sosyura, D., 2012. The politics of government investment. Journal of Financial Economics 106 (1), 24–48.

Duchin, R., Sosyura, D., 2012. Safer ratios, riskier portfolios: banks response to government aid. University of Michigan working paper.

Faccio, M., 2006. Politically connected firms. American Economic Review 96, 369–386.

Faccio, M., Masulis, R.W., McConnell, J.J., 2006. Political connections and corporate bailouts. Journal of Finance 61 (6), 2597–2635.

Hirtle, B.J., Lopez, J.A., 1999. Supervisory information and the frequency of bank examinations. FRBNY Economic Policy Review.

Hoshi, T., Kashyap, A.K., 2010. Will the U.S. bank recapitalization succeed? Eight lessons from Japan. Journal of Financial Economics 97 (3), 398–417.

Ivashina, V., Scharfstein, D.S., 2010. Bank lending during the financial crisis of 2008. Journal of Financial Economics 97 (3), 319–338.

Khwaja, A., Mian, A., 2005. Do lenders favor politically connected firms? Rent provision in an emerging financial market. Quarterly Journal of Economics 120 (4), 1371–1411.

Krozner, R., Laeven, L., Klingebiel, D., 2007. Banking crises, financial dependence, and growth. Journal of Financial Economics 84 (1), 187–228.

La Porta, R., Lopez-de-Silanes, F., 1999. The benefits of privatization: evidence from Mexico. Quarterly Journal of Economics 114 (4), 1193–1242.

Maddala, G.S., 1983. Limited-Dependent and Qualitative Variables in Econometrics. Cambridge University Press., Cambridge, UK.

McLean, D., 2011. Share issuance and cash savings. Journal of Financial Economics 99 (3), 693–715.

Peek, J., Rosengren, E.S., 2000. Collateral damage: effects of the Japanese bank crisis on real activity in the United States. American Economic Review 90 (1), 30–45.

Rajan, R., Zingales, L., 1998. Financial dependence and growth. American Economic Review 88 (3), 393–410.

Sapienza, P., 2004. The effects of government ownership on bank lending. Journal of Financial Economics 72 (2), 357–384.

SIGTARP, August 6, 2009. Opportunities to Strengthen Controls to Avoid Undue External Influence over Capital Purchase Program Decision-Making. Audit report.

Taliaferro, R., 2009. Where Did the Money Go? Commitments, Troubled Assets, New Lending, and the Capital Purchase Program. Harvard Business School working paper.

Veronesi, P., Zingales, L., 2010. Paulson's gift. Journal of Financial Economics 97 (3), 339–368.

Wilson, L., Wu, Y., 2012. Escaping TARP. Journal of Financial Stability 8 (1), 32–42.

Wooldridge, J.M., 2010. Econometric Analysis of Cross Section and Panel Data, second ed. MIT Press, Cambridge, MA.