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HOW DID THE FINANCIAL CRISIS AFFECT SMALL-BUSINESS LENDING IN THE UNITED STATES?

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Abstract

We analyze changes in lending by U.S. banks to businesses from 1994 to 2011. We find that lending to businesses, and in particular to small businesses, declined precipitously following onset of the financial crisis. We also examine the relative changes in business lending by banks that did, and did not, receive Troubled Asset Relief Program (TARP) funds from the U.S. Treasury, and find that banks receiving capital injections from the TARP failed to increase their small-business lending. Finally, we find strong and significant positive relations of both bank capital adequacy and profitability with small-business lending.

JEL Classification: G01, G21, G28, G32, H08, H25

I. Introduction

When the U.S. residential housing bubble burst in 2007–2008, credit markets in the United States and around the world seized up. Lax underwriting standards saddled U.S. banks, large and small, with levels of nonperforming loans not seen since the banking crisis of the late 1980s. During 2009, the Federal Deposit Insurance Corporation (FDIC) closed more than 100 banks, for the first time since 1992. From 2009 to 2011, a total of 397 banks were closed. As of year-end 2011, 813 banks appeared on the FDIC's list of "problem banks"—up more than an order of magnitude from a mere 76 as of year-end 2007, but down from a high of almost 900 as of year-end 2010.[1] Almost 600 additional banks disappeared as a result of mergers, with the majority being motivated by capital-adequacy issues.

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[1]A "problem bank" is one that is deemed by regulators as likely to fail in the near term, receiving a composite CAMELS rating of 4 or 5 on its most recent on-site examination.

Anecdotal evidence suggests that small businesses, which largely rely on banks for credit, were hit especially hard by the financial crisis.[2] In addition, the Federal Reserve System's quarterly Senior Loan Officer Opinion Survey on Bank Lending Practices found evidence that lending standards for small business loans tightened during 2008–2009, as lenders' tolerance for risk decreased following onset of the crisis.[3] In response to the financial crisis, Congress passed laws aimed at boosting the availability of capital to small businesses, beginning with the Troubled Asset Relief Program (TARP) in 2008. Table A1 in the Appendix provides a summary of these legislative efforts.

The availability of credit is one of the most fundamental issues facing a small business and therefore has received much attention in the academic literature (see, e.g., Petersen and Rajan 1994; Berger and Udell 1995, 1998; Cole 1998; Cole, Goldberg, and White 2004; Berger et al. 2005). In this article, we extend this literature by analyzing data on small-business lending collected by U.S. banking regulators to provide new evidence on how the financial crisis affected bank lending to small businesses. Our analysis reveals that from 2008 to 2011, small-business lending declined by $98 billion, or almost 15%, from $658 billion to only $560 billion.[4] Small commercial and industrial (C&I) lending declined by even more, falling by more than 17% over the same period. The bottom of the collapse did not occur until 2013, and the recovery during 2014–2019 was anemic.

We also examine the relative changes in small-business lending by banks that did, and did not, receive funds from the TARP. As part of the TARP, the U.S. Treasury injected more than $200 billion of capital into more than 700 U.S. banking organizations to stabilize their subsidiary banks and promote lending, especially lending to small businesses. This effort is more formally known as the Capital Purchase Program (CPP), which began in late October 2008 with capital injections into the eight largest bank holding companies. With a few notable exceptions, the success of the CPP in promoting lending in general, and small-business lending in particular, has been neglected until now.

Why is this analysis of importance? According to the U.S. Department of Treasury and Internal Revenue Service, there were almost 33 million businesses that filed taxes for 2012, of which 23 million were nonfarm sole proprietorships, 4 million were S-corporations, 3 million were partnerships, and 2 million were C-corporations; all but about 10,000 C-corporations are privately held and the vast majority have annual revenues less than $1 million.[5] Small firms are vital to the U.S. economy. According to the U.S. Small Business Administration (SBA), small businesses account for 99.9% of all businesses, 48% of private-sector employment, half of all U.S. private-sector employment, and produced 63% of net job growth in the United States between

[2]Using data from the Federal Reserve's 1993, 1998, and 2003 Surveys of Small Business Finances (SSBFs), Cole (2010) finds that about 60% of all small firms use some form of bank credit.

[3]The results of these Federal Reserve surveys can be downloaded from http://www.federalreserve.gov/boarddocs/snloansurvey/.

[4]See Table A2 in the Appendix, which is based on annual data provided by the June Call Reports.

[5]See the U.S. Internal Revenue Service statistics for integrated business data at https://www.irs.gov/uac/soi-tax-stats-integrated-business-data. The year 2012 is used for reference because it was the latest year for which statistics were available at the time this article was written.

1992 and 2013.[6] Therefore, by better understanding how bank credit to small businesses was affected by the financial crisis, we can help policy makers take actions that will lead to more credit, which will translate into more jobs and faster economic growth.

Here, we provide new evidence on how successful, or more accurately, how unsuccessful the CPP turned out to be. Our evidence shows that small-business lending by banks participating in the CPP fell even more than at banks not receiving funds from the CPP. In other words, TARP banks took the taxpayers' money but then cut back on lending by even more than banks not receiving taxpayer dollars.

Figure I shows the amount of TARP money injected into the largest financial institutions in 2008. On October 28, 2008, the 8 largest received $115 billion: Citibank, JPMorgan Chase, and Wells Fargo each received $25 billion; Bank of America received $15 billion; Goldman Sachs and Morgan Stanley (both primarily investment rather than commercial banks) each received $10 billion; and Bank of New York and State Street received $3 billion and $2 billion, respectively. On November 14, 2008, an additional 21 banks received another $33.6 billion in TARP funds.

Figure II shows the percentage decline in small-business lending from 2008 to 2011 at these same institutions.[7] At 11 of the 16 large bank holding companies shown, small-business lending declined by more than 20%; at 13, by more than 10%; and all 16 reduced small-business lending.

Moreover, these cutbacks in bank lending dwarfed other governmental efforts to boost the amount of credit available to small businesses, such as the SBA's 7a and 504 programs, which saw an increase of $10 billion following onset of the financial crisis. Figures III and IV show use of the SBA's 7a and 504 programs, respectively, over fiscal years 2001–2011.

Additional analysis incorporating county-year fixed effects reveals that the relative declines in lending by TARP banks is due in part to differences in local-market demand. However, this analysis finds no evidence that TARP banks increased their small-business lending. In summary, these results show that the TARP's CPP failed to boost bank small-business lending—one of its primary goals. We acknowledge that one cannot know how much the TARP banks would have lent had they not participated in the CCP. Their observed lending could be a significant increase over this counterfactual.

We contribute to the literature on the availability of credit to small businesses in at least six important ways. First, we provide new evidence of how severely bank lending to businesses, and especially small businesses, in the United States was curtailed by the financial crisis. Both theory, dating back to Schumpeter (1934),[8] and more recent empirical research (e.g., King and Levine 1993a, 1993b; Rajan and Zingales 1998) indicate that capital-constrained firms grow more slowly, hire fewer

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[6]See "Frequently Asked Questions," Office of Advocacy, U.S. Small Business Administration (2016) at https://www.sba.gov/sites/default/files/advocacy/SB-FAQ-2016_WEB.pdf. The SBA defines a small business as "an independent firm with fewer than 500 employees." We follow that definition in this article.

[7]We exclude Bank of New York, Goldman Sachs, Morgan Stanley, and State Street Bank because these financial institutions had little or no presence in the small-business loan market before the financial crisis.

[8]Aghion and Howitt (1988) provide a comprehensive exposition of Schumpeter's (1934) theory of economic growth.

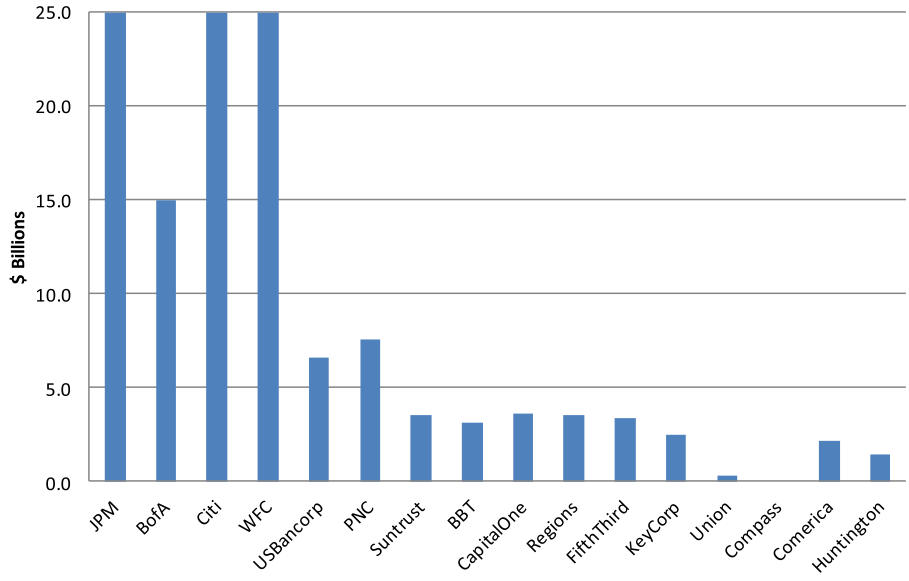

Figure I. 2008 TARP Capital Injections. Large U.S. bank holding companies with $50+ billion in total assets. Source: TARP Investment Transaction Reports, U.S. Treasury Department. [Color figure can be viewed at wileyonlinelibrary.com]

workers, and make fewer productive investments than firms using debt in their capital structure. A better understanding of how the financial crisis affected bank lending to small businesses should provide policy makers with guidance on how to tailor economic and tax policies to boost bank lending to small firms, thereby increasing both employment and gross domestic product (GDP).

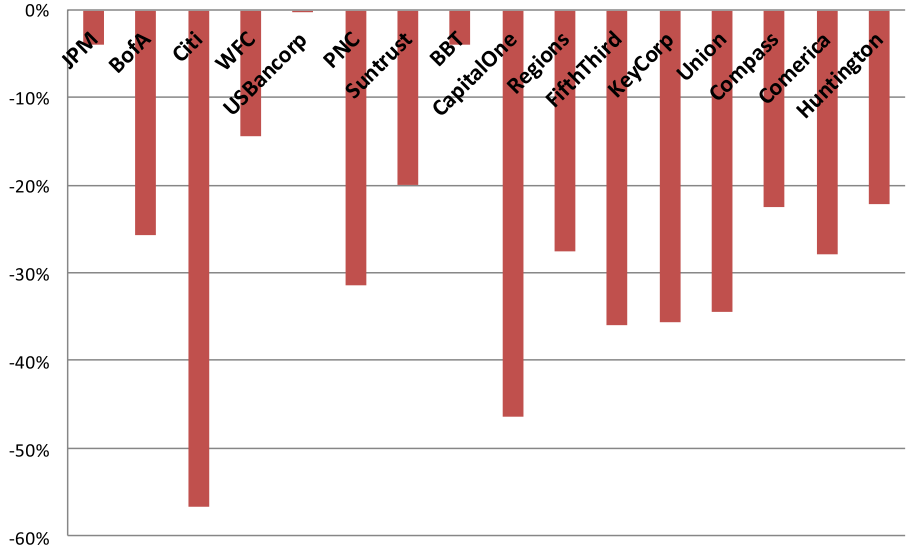

Figure II. Percentage Change in Dollar Amount of Small-Business Lending, 2008–2011. Large U.S. bank holding companies with $50+ billion in total assets.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

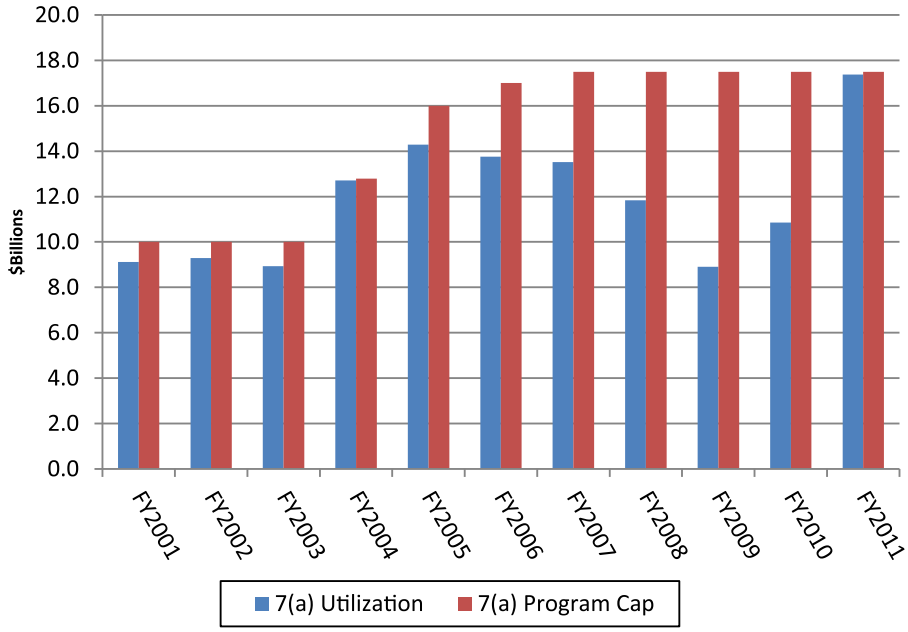

Figure III. U.S. Small Business Association 7(a) Program: Use versus Cap.
Sources: Budget of the U.S. Government; U.S. Small Business Administration appendix, various fiscal years; and Congressional Research Service. [Color figure can be viewed at wileyonlinelibrary.com]

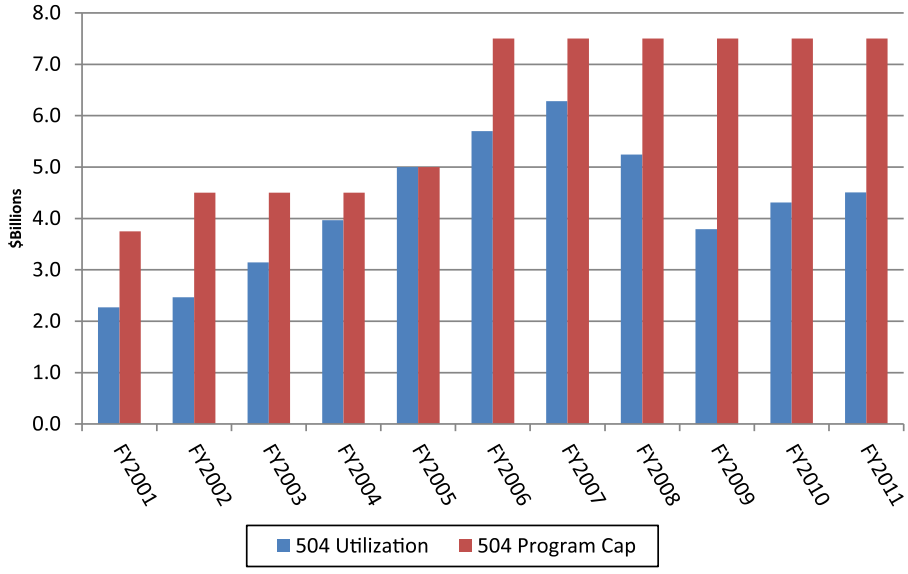

Figure IV. U.S. Small Business Administration 504 Program: Use versus Cap FY2001–FY2011.
Sources: Budget of the U.S. Government; U.S. Small Business Administration appendix, various fiscal years; and Congressional Research Service. [Color figure can be viewed at wileyonlinelibrary.com]

Second, we provide new evidence on the relation between capital adequacy and bank lending. We document a strong and robust positive relation between a bank's capital ratio and its subsequent change in business lending. This has important policy implications as bank regulators in both the United States and around the world continue to consider raising minimum capital ratios for banks in response to the outcome of the financial crisis. Our new evidence supports a move to higher capital requirements and refutes claims by banking industry lobbyists that higher capital requirements reduce bank lending. To the contrary, we show that higher capital standards improve the availability of credit to U.S. firms, especially to small businesses.

Third, we find a strong and significant negative relation between bank size and small-business lending. This has important policy implications as bank regulators consider proposals to limit and/or reduce the size of banks. Our new evidence suggests that proposals to reduce the size of the largest banks lead to more small-business lending.

Fourth, we find a strong and significant negative relation between bank profitability and business lending. This new evidence is consistent with moral hazard induced by deposit insurance, which leads unprofitable banks to increase their risk exposure so as to exploit the subsidy from deposit insurance.

Fifth, we find a strong and significant positive relation between our indicator for de novo banks and business lending. This new evidence complements existing studies of lending by de novo banks and suggests that regulators should enact policies to encourage the formation of new banks as one way to increase business lending.

Finally, we provide new evidence on the track record of the CPP in boosting bank lending to small firms. More than $200 billion in taxpayer dollars was invested in this program, which officially ended April 3, 2011, with an expected loss (according to the U.S. Congressional Budget Office) of more than $25 billion. Our results show that this program failed to boost lending to small businesses, or to businesses of any size, by banks that received capital injections.

II. Review of the Literature: Availability of Credit to Small Businesses

The issue of credit availability to small businesses has been studied by financial economists for 60 or more years, dating back at least to Wendt (1947), who examines availability of loans to small businesses in California. Since then, scores of articles have addressed this issue.

We limit our review of the literature to the most prominent studies of bank lending using bank-level loan data that have appeared in the financial economics literature during the past few years, especially those that use bank Call Report data on small-business loans.[9] The study most closely related to ours from a methodological viewpoint is by Peek and Rosengren (1998), who examine the impact of bank mergers

[9]There is also a related body of work on the availability of credit that relies on information on the SSBFs (see, e.g., Petersen and Rajan 1994; Berger and Udell 1995, 1996, 1998; Cole 1998, 2008, 2009, 2010, 2013; Cole, Goldberg, and White 2004; Cole and Sokolyk 2016).

on small-business lending.[10] Like us, they examine the change in small-business lending (as measured by the ratio of small-business loans to total assets) by groups of banks subject to different "treatments." In their study, the treatment is whether the bank was involved in a merger, whereas in our study, the treatment is whether the financial crisis had begun, as well as whether the bank participated in the CPP. Peek and Rosengren find that small-business lending of the consolidated bank postmerger converges toward the small-business lending of the premerger acquirer rather than that of the premerger target. Their study also makes clear the importance of adjusting for bank mergers over time.

Another closely related study is by Berger and Udell (2004), who examine changes in bank lending to test what they call the "institutional memory" hypothesis. They construct a bank-level data set that spans 20 years—from 1980 through 2000—and calculate the annual change in the outstanding amounts of commercial loans, which they use as their primary dependent variable. They regress this dependent variable against a set of explanatory variables designed to measure institutional memory (their primary variable of interest), as well as variables designed to measure the health of the bank and overall loan demand. Berger and Udell (2004) do not examine small-business loans or the impact of the recent financial crisis on bank lending.

Ivashina and Scharfstein (2010) use loan-level data from DealScan to analyze changes in the market for large, syndicated bank loans. Their focus is on whether banks, more vulnerable to contagion following the failure of Lehman Brothers, reduced their lending by more than other banks. As they note, both DealScan and the regulatory database on bank loans that we use capture only a portion of total bank lending to businesses. In that respect, our study is complementary to theirs. They cover large, syndicated loans that often are securitized and do not appear on bank balance sheets, whereas we cover smaller, nonsyndicated loans that are not securitized but remain on the balance sheets of bank lenders.

Chu, Zhang, and Zhao (2019) and Berger, Makaew, and Roman (2019) also use DealScan data to examine syndication patterns for business loans. Chu, Zhang, and Zhao find that well-capitalized banks make larger contributions to loans than those with less capital. Hence, as TARP funding provided more capital, participating banks increased their contributions to syndicated loan transactions. Berger, Makaew, and Roman analyze contract terms for these larger loans around the financial crisis. They determine that TARP funding allowed borrowers to obtain more favorable provisions through credit spreads, loan amounts, maturity, collateral requirements, and covenants, suggesting that capital injections lead to an increase the syndicated loan supply.

Kwan (2010) looks at the financial crisis and bank lending, but does so by analyzing changes in rates on C&I loans, using data from the Federal Reserve's Survey of the Terms of Bank Lending (STBL). The STBL covers loans originated

[10]Several studies examine how mergers affect small business lending (Berger et al. 1998; Cole and Walraven 1998; Ely and Robinson 2001; Strahan and Weston 1998), but the methodologies in those studies differ from the methodology used here. In addition, many of those studies examine data from the Survey of Terms of Bank Lending rather than from the June Call Reports.

by a panel of about 340 banks that consists of most of the largest banks, and a stratified-random sample of smaller banks. Again, our study can be viewed as a complement to Kwan's study. He examines price effects, whereas we analyze the quantity effects of the financial crisis. Although Kwan does not focus on small-business loans, he does present information on small loans that is available from the STBL.

Li (2013) also looks at how the financial crisis affected bank lending, but her focus is on total loan growth by banks that participated in the CPP. She finds that CPP investments boosted bank lending at capital-constrained banks by 6.41% per annum. However, her analysis looks at changes in lending only from 2008Q3 to 2009Q2, so it does not exploit the panel nature of bank data nor does it capture the full effects of the financial crisis.

Cornett et al. (2011) analyze how the financial crisis affected bank lending but focus on the role of liquidity-risk management. They find that banks holding more illiquid assets, funded by sources other than core deposits and equity, reduced lending more than other banks to increase their liquid assets. They also find that banks with greater unused loan commitments increased lending by more than other banks, as borrowers drew down preexisting lines of credit when other sources of funding had dried up. Cornett et al. look only at total lending, whereas we focus on business lending and, in particular, small-business lending. Also, Cornett et al. do not adjust their data for mergers; instead, they simply remove all banks whose assets grew by more than 10% in a quarter. We estimate that this would exclude a significant number of observations during the sample period.

Black and Hazelwood (2013) examine the impact of the TARP on bank lending, as we do, but from a different perspective. Using data from the Fed's STBL, they analyze the risk ratings of individual commercial loans originated during the crisis. They find that risk taking increased at large TARP banks but declined at small TARP banks, whereas lending, in general, declined.

Duchin and Sosyura (2014) also analyze the effect of the CPP on bank lending and risk taking. Using data on individual mortgage applications, they find that the change in mortgage originations was no different at TARP banks than at non-TARP banks with similar characteristics, but that TARP banks increased the riskiness of their lending relative to non-TARP banks. Duchin and Sosyura find similar results for large syndicated corporate loans.

Mills and McCarthy (2014) assess the access to credit by small businesses during the postcrisis recovery years and how technology may play an important future role. They argue that structural barriers are at play, such as ongoing consolidation in the banking industry and high transaction costs of small-dollar-value loans, which impede bank lending to small businesses. They posit that emerging online lenders use technology to mitigate these structural barriers by providing an alternative supply of small business credit. They estimate that online lenders made about $5 billion in small-business loans during 2014 and were growing at 175% per year.

Jagtiani and Lemieux (2016) use Federal Financial Institutions Examination Council (FFIEC) Call Report data on the amount of small-business loans outstanding at depository institutions to document how, since the 1990s, the market share of small-business loans has

risen at large banks at the expense of community banks. This trend accelerated following onset of the financial crisis in 2008. They also find that during the run-up to the financial crisis, when housing prices were rising rapidly, small businesses increased the use of home equity lines of credit to fund their operations.

Amel and Mach (2017) assess the success of the Small Business Lending Fund (SBLF), implemented as part of the 2010 Small Business Jobs Act, in providing loans to small businesses. Using FFIEC Call Report data, they find that among community banks and thrift institutions, those that received SBLF injections increased small-business lending by about 10% more than those that did not. However, Amel and Mach argue that this difference in loan growth was already present in the two groups before the capital injections and that statistically the SBLF did not materially change the volume of small-business lending.

Chavaz and Rose (2019) consider the political nature of TARP allotments. They find that after receiving capital injections, TARP recipients issued significantly more mortgage and small-business loans within the congressional district of their headquarters compared to surrounding areas. As a result, loan performance was worse in these areas, highlighting issues caused by political pressure. These impacts were magnified if the district's congressperson had more political influence or greater ties to the financial industry.

Bassett, Demiralp, and Lloyd (2020) take an all-encompassing approach to evaluate government support in the wake of the financial crisis. Their data set aggregates five debt and equity support programs that affected bank operations, determining that these programs helped reduce the number of bank failures but did not meaningfully increase the availability of credit to borrowers. Using loan data from the FFIEC Call Reports, Bassett, Demiralp, and Lloyd find that neither total, C&I, nor commercial real estate (CRE) loan growth was significantly greater at institutions that received government funding, compared with those that did not.

III. Data

To conduct this study, we use data from several sources. Our primary source of data is the FFIEC's quarterly financial reports of income and condition that are filed by each commercial bank in the United States, which are known to bank researchers as Call Reports.[11] As part of the FDIC Improvement Act of 1991, which was passed to address regulatory shortcomings identified during the last major banking crisis, banking regulators were directed (in Section 122) to begin collecting annual data on lending to small businesses and small farms.[12] To comply with this requirement, beginning in

[11]The FFIEC is an interagency body that, among other duties, collects periodic financial information filed by depository institutions (known informally as "Call Reports") on behalf of the Federal Reserve System, the FDIC, and the Office of the Comptroller of the Currency (OCC). At the time this article was written, the Call Report data from 1976 through 2010 were freely available to the public for download from the website of the Federal Reserve Bank of Chicago at http://www.chicagofed.org/webpages/banking/financial_institution_reports/commercial_bank_data.cfm. At the time this article was written, Call Report data for 2011 and later years were freely available to the public for download from the website of the FFIEC at https://cdr.ffiec.gov/public/PWS/DownloadBulkData.aspx.

[12]See the text of Section 122 at http://www.fdic.gov/regulations/laws/rules/8000-2400.html.

1992, the June Call Report includes a section that gathers information on small-business lending—Schedule RC-C Part II: Loans to Small Businesses and Small Farms. The schedule collects information on the number and amount of loans outstanding secured by nonfarm nonresidential properties/C&I loans with original loan amounts of (1) less than $100,000, (2) $100,000 to $250,000, and (3) $250,000 to $1 million. These are the two primary types of commercial loans made by commercial banks and correspond to items collected in Part I of Schedule RC-C, which provides the amounts of all loans secured by nonfarm nonresidential properties/C&I loans.[13] Table A2 in the Appendix presents statistics on selected variables from the June Call Reports from 1994 to 2011 by bank asset-size class, including total assets, total loans, total C&I loans, total CRE loans, total small-business loans, total small C&I loans, and total small CRE loans. Table A3 presents information on the same variables but expressed as percentages of annual industry total assets. In 2009, the decision was made to change the reporting frequency from annually to quarterly.[14] Quarterly reporting of Section RC-C Part II began with the March 2010 Call Report.

It is important to account for the effect of mergers in calculating changes in bank balance-sheet data over time. During our 1994–2011 sample period, more than 9,000 banks disappeared via mergers. This means that about 6% of our bank-year observations are affected by these mergers. To account for the impact of mergers on the balance sheet of acquiring banks, we employ the following procedure. We identify the acquirer and target, as well as the date of each acquisition, using information from the FDIC's Institution Directory —our second data source.[15] We then use this information to combine the values of each dollar-denominated item reported in the period before the merger. For example, if Bank A acquires Bank B during year $t-0$, we sum the values of dollar-denominated items for Bank A and Bank B during year $t-1$. We then calculate the change in dollar-denominated items for Bank A as the reported values for year-end $t-0$ and the sum of values for Bank A and Bank B for year-end $t-1$. This ensures that the changes in the loan variables that we measure are the result of changes in lending, and not the result of mergers.

Our third source of data is information on the TARP found on the website of the U.S. Treasury, where we obtain information on which banks participated in the CPP.[16] One of the stated goals of the CPP was to encourage lending to small businesses. We identify 743 transactions totaling to $205 billion in capital injections from October 28, 2008 through December 31, 2009. After accounting for multiple

[13]The schedule also identifies banks that make a substantial percentage of their business loans in original amounts less than $100,000. There are about 1,000 such banks. For these banks, the values of business loans from Part I of Schedule RC-C are used as the values of small-business loans.

[14]See Notices in the *Federal Register,* Vol. 72, No. 245 (Wednesday, December 23, 2009) at http://www.ffiec.gov/PDF/FFIEC_forms/FFIEC031_FFIEC041_20091223_ffr.pdf.

[15]At the time this article was written, the FDIC's Institution Directory was available for download from the webpages of the FDIC at https://www7.fdic.gov/idasp/advSearch_warp_download_all.asp?intTab=1. This directory includes the FDIC Certificate Number of each inactive bank along with the certificate number of its acquirer.

[16]At the time this article was written, this information was freely available to the public for download at the website of the U.S. Treasury at https://www.treasury.gov/initiatives/financial-stability/reports/Pages/TARP-Investment-Program-Transaction-Reports.aspx. We use the December 31, 2011 version of the report.

transactions, we identify 703 institutions that received injections, of which 61 are office of thrift supervision (OTS) regulated thrifts, which file different Call Reports; hence, we exclude them from our analysis. This leaves 642 institutions in our TARP sample, but many of these are multibank holding companies. We match these institutions to a list of bank holding companies taken from the December 2008 Federal Reserve's Consolidated Financial Statements for Bank Holding Company Report FR Y9-C (our fourth source of data), downloaded from the website of the Federal Reserve Bank of Chicago.[17] Finally, we merge the "high-holder" codes of these banks with the June 2008 FFIEC Bank Call Report to obtain a TARP sample of 911 FDIC-insured banks. We then merge these banks with the June 2009 FFIEC Bank Call Report, which is our first post-TARP data point. This reduces our TARP sample to 864 banks for which we can calculate changes in lending from before the TARP.

IV. Methodology

Univariate Tests

To provide new evidence on how the financial crisis affected bank lending to small businesses, we employ both univariate and multivariate tests. First, we use graphs and univariate statistics to analyze both the level and changes in the dollar amounts of small-business lending in aggregate and by bank size. Figure V shows that the dollar amounts of total business loans continued to rise after the crisis began in 2008 but declined from 2009 to 2011. In contrast, the dollar amounts of C&I loans dropped significantly from 2008 to 2009 and continued to drop in 2010, falling by a total of more than 18% from a high of $1.2 trillion; C&I lending rose slightly in 2011. Over this same period, total assets increased by more than $650 billion, or almost 6%, but instead of making new loans, banks invested in government securities.

As shown in Figure VI, the dollar amounts of total small-business lending declined by about 15%, or $98 billion from 2008 to 2011. Just over half of this decline ($53 billion) was in small C&I loans with the remainder ($44 billion) in small CRE loans. Almost half of this decline occurred at banks with less than $1 billion in assets.

In addition to looking at small-business lending by bank size, we examine how participation in the CPP affected small-business lending by those banks that did, and those that did not, receive capital injections.

Multivariate Tests

We conduct multivariate tests on the data. More specifically, we use a variation of the difference-in-difference methodology, which dates back to the seminal study by Ashenfelter and Card (1985), to analyze differences in lending by TARP versus non-TARP banks. Imbens and Wooldridge (2007) explain the methodology as follows:

[17]As the time this article was written, the Y9C data were freely available to the public for download from the website of the Federal Reserve Banks of Chicago at https://www.chicagofed.org/banking/financial-institution-reports/bhc-data.

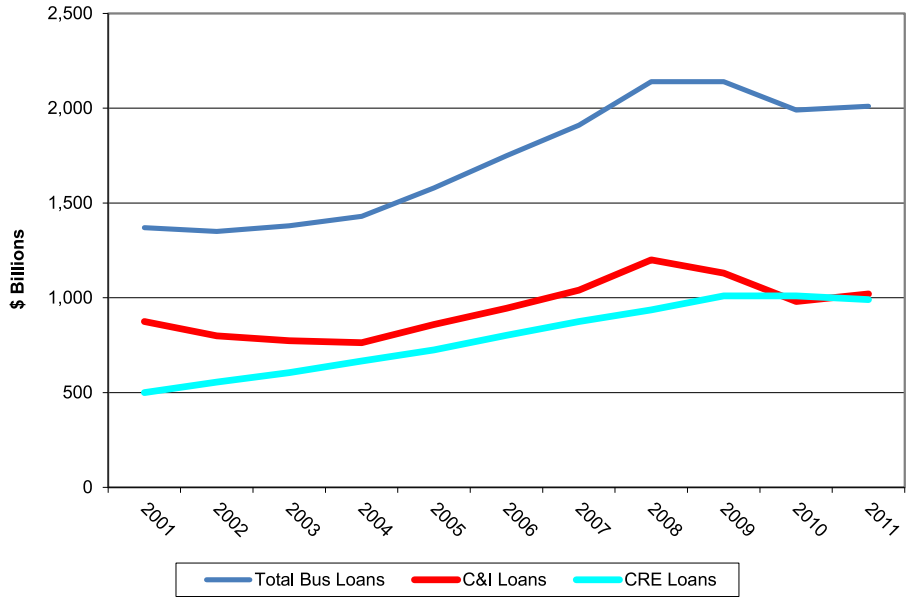

Figure V. Amounts of Commercial Bank Business Loans 2001–2011.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

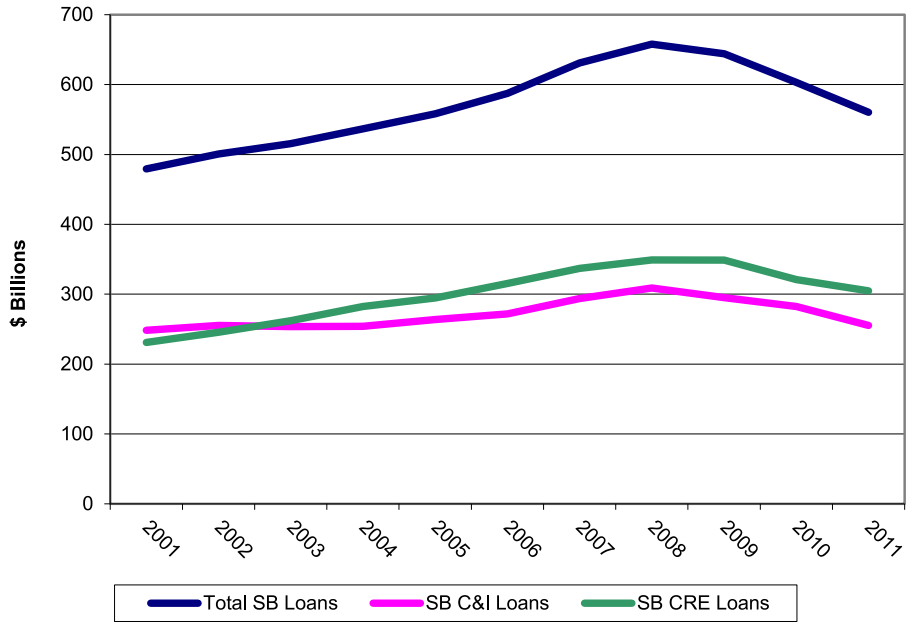

Figure VI. Amounts of Commercial Bank Small-Business Loans 2001–2011.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

> The simplest set-up is one where outcomes are observed for two groups for two time periods. One of the groups is exposed to a treatment in the second period but not in the first period. The second group is not exposed to the treatment during either period. In the case where the same units within a group are observed in each time period, the average gain in the second (control) group is subtracted from the average gain in the first (treatment) group. This removes biases in second-period comparisons between the treatment and control group that could be the result from permanent differences between those groups, as well as biases from comparisons over time in the treatment group that could be the result of trends. (p. 1)

We use participation in the TARP to classify banks into treatment and control groups: both groups are exposed to an exogenous shock—the onset of the financial crisis. We estimate the difference in the change in the stock and flow of business lending for each group using a fixed-effects panel-data regression model.

We use this fixed-effects regression model to explain three measures of small-business lending: (1) the year-over-year percentage change in the dollar value of small-business loans (as measured by Berger and Udell 2004), (2) the year-over-year change in the ratio of small-business loans to total assets (as measured by Peek and Rosengren 1998), and (3) the natural logarithm of the dollar value of small-business loans.

Our first measure enables us to test whether banks increased or decreased the absolute amount of lending, whereas our second measure enables us to test whether banks increased or decreased their small-business lending relative to their allocation of assets to other purposes. If banks proportionately decreased all assets to boost their capital ratios, we would see a decline in our first measure but no change in our second measure. If banks disproportionately decreased lending to small businesses, we would see declines in both measures.

Our third measure is closely related to our first measure because we include the lagged value of the dependent variable as a control variable. If we constrain the coefficient on this control variable to be 1.00, the model would be algebraically equivalent to our first model. Essentially, our first model imposes this coefficient constraint, whereas our third model relaxes this constraint. Our general fixed-effects model takes the form:

$$\begin{aligned} \textit{Small Bus. Loans}_{i,t} = \beta_0 + \beta_1 \times \textit{Treatment}_{i,t-1} + \beta_2 \times \textit{Treatment} \times \textit{Postcrisis}_{i,t-1} \\ + \beta_k \times \textit{Controls}_{i,t-1} + \epsilon_{i,t}, \end{aligned} \tag{1}$$

where $\textit{Small Bus. Loans}_{i,t}$ is one of our three measures of small-business lending:

1. $\textit{Chg. Small Bus. Loans}_{i,t}$ is the year-over-year percentage change in the dollar value of small-business loans outstanding reported by bank i at time t–0 and the dollar value of small-business loans outstanding reported by bank i at time t–1.
2. $\textit{Chg. Small Bus. Loans/Total Assets}_{i,t}$ is the year-over-year change in the ratio of the dollar value of small-business loans outstanding to the dollar value of total assets reported by bank i at times t–0 and t–1.

3. Ln(*Small Bus. Loans*)$_{i,t}$ is the natural logarithm of the dollar value of small-business loans outstanding reported by bank i at time t–0.

We also analyze separately the two components of total small-business lending: small C&I loans and small CRE loans. We estimate equation (1) for each component, and for each of the three measures of small-business lending.

In addition, we analyze business lending to firms of all sizes—total business lending, which we define as total CRE lending plus total C&I lending. Again, we use the three alternative lending measures—percentage change in the amount of lending, the change in the ratio of total lending to total assets, and the log of the amount of lending.

$$Total\ Business\ Loans_{i,t} = \beta_0 + \beta_1 \times Treatment_{i,t-1} + \beta_2 \times Treatment \times Postcrisis_{i,t-1} + \beta_k \times Controls_{i,t-1} + \epsilon_{i,t}, \quad (2)$$

where *Total Business Loans*$_{i,t}$ is one of our three measures of business lending by bank i in period t to firms of all sizes:

1. *Chg. Business Loans*$_{i,t}$ is the year-over-year percentage change in the dollar value of all business loans outstanding reported by bank i at time t–0 and the dollar value of all business loans outstanding reported by bank i at time t–1.
2. *Chg. Busines Loans/Total Assets*$_{i,t}$ is the year-over-year change in the ratio of the dollar value of all business loans outstanding to the dollar value of total assets reported by bank i at times t–0 and t–1.
3. Ln(*Business Loans*)$_{i,t}$ is the natural logarithm of the dollar value of all business loans outstanding at bank i during period t–0.

As with small-business lending, we analyze separately the two components of total business lending: all C&I loans and all CRE loans. We estimate equation (2) for each component and for each of the three measures of business lending.

By comparing our results for small-business lending with our results for all business lending, we can provide evidence regarding whether declines in small-business lending were more, or less, severe than declines in total business lending.

In our fixed-effects model, the vector β_0 includes a set of dummy variables for each bank and for each period. Standard errors are clustered at the bank level. The bank dummies control for the effects of each bank's time-invariant characteristics on lending, and the time dummies measure the amount of lending that cannot be accounted for by bank dummies and other control variables in each period. Therefore, the coefficients of the time dummies capture unexplained changes in lending for each period. We use 2007 as the relative reference point—the year before the crisis. We use the time dummies for periods after the onset of the crisis to measure changes in lending due to the crisis. However, it is important to note that these dummies capture changes in lending due to both changes in demand conditions and changes in supply conditions.

We define *Treatment*$_{i,t-1}$ as a treatment variable expected to affect lending. This variable enables us to test whether the impact of the financial crisis differed across

treated and untreated banks. We use *TARP* as our treatment, which equals 1 if a bank began to participate in the TARP's CPP during the 12 months prior, and 0 otherwise.

To determine whether changes in lending, following the onset of the financial crisis in 2008, were due to participation in the TARP, we set *Postcrisis* equal to 1 for 2009–2011, and 0 for all other years. We then interact *Postcrisis* with our treatment variable *TARP* (*TARP* × *Postcrisis*). The coefficient β_2 measures the average annual change in lending for 2009–2011 after the onset of the crisis associated with participation in the TARP. If the financial crisis led banks participating in the TARP to reduce lending more than non-TARP banks, as we hypothesize, β_2 should be negative and statistically significant.

We define a vector $Controls_{i,t-1}$, which includes a set of bank-level control variables measured as of period $t-1$. We choose our bank-level control variables based on previous research. First, we follow Peek and Rosengren (1998) and Berger and Udell (2004) by including various measures of financial health as captured by proxies for components of the CAMELS supervisory ratings system: capital, asset quality, earnings, and liquidity. More specifically, we include *Total Equity;* nonperforming loans (*NPLs*), defined as the sum of loans past due 30–89 days and still accruing interest, loans past due 90 days or more and still accruing interest, nonaccrual loans, and other real estate owned (*OREO*); *Net Income*; and *Liquid Assets,* defined as cash and due from banks, plus Fed Funds purchased and securities purchased under reverse repurchase agreements, plus securities held to maturity, plus securities available for sale. As an alternative measure of asset quality, we follow Berger and Udell (2004) in using the allowance for loan and lease loss (*Loss Reserves*). Each is measured as of the previous year and expressed as a percentage of total assets. We expect a positive relation between bank health and changes in business lending; therefore, we expect positive coefficients on *Total Equity*, *Net Income,* and *Liquid Assets,* and negative coefficients on *NPLs* and *Loss Reserves*.

Next, we follow Cornett et al. (2011) by including *Core Deposits*, defined as the ratio of core deposits to total assets as of the previous year, and *Commitments,* defined as the ratio of business loan commitments to total credit commitments where total credit commitments is defined as the sum of total assets and total loan commitments. Cornett et al. argue that banks responded to the liquidity shock that accompanied the financial crisis by reducing new loan originations, and that banks exposed to more liquidity risk reduced lending by more than other banks. They proxy liquidity exposure on the asset side of the balance sheet by the ratios of illiquid assets to total assets and loan commitments to total credit, and on the liability side of the balance sheet by the ratios of total equity to assets and core deposits to assets.

On the asset side, banks with more illiquid assets and more loan commitments want to reduce new loan commitments to reduce their liquidity risk from having to fund new loans drawn on existing commitments. On the liability side, banks with less equity and fewer core deposits want to reduce new loan commitments to reduce their liquidity risk from having to fund new loans drawn on existing commitments at a time when other sources of funds, such as wholesale deposits and short-term borrowing, had dried up. Consequently, we expect a positive coefficient on each of these variables.

Cornett et al. (2011) also argue that it is important to control for *Bank Size* because depositors and investors may prefer the safety of too-big-to-fail institutions. This gives larger banks a funding advantage during times of crisis, lessening their need

to reduce new loan commitments. We include the natural logarithm of total assets as of the prior year as our measure of bank size. During normal times, small-business lending is less important to larger banks, so we expect a negative relation between bank size and changes in small-business lending. We have no expectation regarding the relation between bank size and total business lending.

We also include *De Novo*, an indicator for de novo banks, which we define as a bank in operation for less than five years as of time $t-0$, because newly chartered banks start with virtually 100% cash on the asset side of the balance sheet and then quickly replace cash with new loans as they develop lending relationships. Consequently, we expect loan growth to be much more rapid at such banks.[18]

We control for the amount of outstanding loans corresponding to each of our six dependent variables, expressed as a percentage of assets. Banks with extremely high exposure to a particular loan category are less likely to increase lending in that loan category and are constrained at the high end by 100% and at the low end by 0%. We expect a negative coefficient on each of these variables.

We define our variables in Table 1. In Table 2, we present descriptive statistics for our analysis variables based on the full sample from 1994 to 2011. Over this full 18-year period, the median bank grew its small-business lending portfolio by about 6.4% per year, but this was in line with asset growth, as the median change in the ratio of small-business loans to total assets did not grow per year. In contrast, the median bank grew its total business portfolio by about 9% per year and increased the median ratio of business loans to total assets by 2.1% per year. Among our control variables, we see that the median bank allocated 15.1% of assets to small-business loans, 19.5% to all business loans, and 33.3% to liquid assets. On the liability side, we see that the median bank funded 52.8% of its assets with core deposits and 9.6% with total equity.

In Table 3, we present descriptive statistics from June 2009 for our subsamples of TARP and non-TARP banks, where change variables are calculated from June 2008 to June 2009, and level variables are calculated as of June 2008. First, with respect to the control variables, we see strong differences in the two subsamples. On average, TARP banks are about twice as large as non-TARP banks ($1.09 billion vs. $450 million) in terms of assets, are less liquid in terms of liquid assets to total assets (20.7% vs. 29.9%) and core deposits to total assets (32.3% vs. 44.2%), are less profitable in terms of return on assets (ROA) (41 basis points vs. 70 basis points), are less well capitalized as measured by total equity to total assets (11.4% vs. 12.0%), and are much more exposed to business loans as a percentage of assets (34.2% vs. 25.2%).

With respect to the dependent variables, we see that, on average, TARP banks grew their small-business loan portfolios more slowly than non-TARP banks (4.6% vs. 6.4%) and actually decreased their allocation of assets to small-business loans by 4.4% whereas non-TARP banks decreased theirs by 0.2%. TARP banks grew their total business loans more quickly than non-TARP banks (10.5% vs. 9.4%) but grew their allocation of

[18]In addition, Goldberg and White (1998) and Goldberg and DeYoung (1999) find that de novo banks allocate a higher portion of their assets to small-business loans than do similar mature banks and that there is a negative relation between bank age and small-business lending.

TABLE 1. Definition of Variables from FFIEC Call Report.

Variable	Definition from FFIEC Call Report
Total Small Bus. Loans	SBL = SUM(SBLCNI, SBLCRE)
Small C&I Loans	If RCON6999 EQ 0, then SBLCNI = SUM(RCON5571, RCON5573, RCON5575), else SBLCNI = RCON1766
Small CRE Loans	If RCON6999 EQ 0, then SBLCRE = SUM(RCON5565, RCON5567, RCON5569), else SBLCRE = RCON1480
Bus. Loans	BL = SUM(RCON1766, RCON1480)
C&I Loans	CNI = RCON1766
CRE Loans	CRE = RCON1480
Liq. Assets	LIQ = SUM(CASH, FFP, SECAFS, SECHTM);
Cash & Due From	CASH = SUM(RCFD0071, RCFD0081);
Fed Funds Purchased/SEC Purchased	If YEAR LE 2001, then FFS = RCFD1350; if YEAR GT 2001, then FFS = SUM(RCFDB987, RCFDB989)
Securities Held to Maturity	SECHTM = RCFD1753
Securities Available for Sale	SECAFS = RCFD1773
Total Equity	EQUITY = RCFD3210
NPLs	NPL = SUM(PD90, NA, REO)
PD90	PD90 = RCON1407
Nonaccrual	NA = RCON1406
OREO	OREO = RCFD2150
Loss Reserves	ALL = RCFD3123
Net Income	NETINC = RIAD4340
Bus. Commitments	BCOMMIT = SUM(RCFD3816, RCFD3817, RCFD3818, RCFD6550)
Total Commitments	TCOMMIT = RCFD3423
Core Deposits	CORE = SUM(RCON2215,RCON6648)
Total Assets	TA = RCFD2170
Total Loans	TL = RCFD1400
Total Credit	TC = SUM(TA, TCOMMIT)
TARP	TARP = 1 if bank received TARP injection during 2008–2009, and 0 otherwise
TARP × Postcrisis	TARP × Postcrisis = 1 if a bank received a TARP injection anytime from 2008 to 2009 and the year is after the date of injection, and 0 otherwise
TARP/Assets	BHC TARP Amount/BHC RCFD2170
TARP/Equity	BHC TARP Amount/BHC RCFD3210
YEAR	YEAR = FLOOR(DATE/10000)
De Novo	DENOVO = YEAR − FLOOR(RSSD9950/10000)

Note: Definitions of analysis variables are taken from the Federal Financial Institutions Examination Council (FFIEC) Call Reports for June 1993–June 2011. RCON and RCFD variables refer to official FFIEC Call Report variables. Call Reports can be downloaded from http://www.ffiec.gov/ffiec_report_forms.htm.

assets to business loans more slowly than non-TARP banks (0.6% vs. 2.5%). Note that this is only for 2009, not for 2009–2011.

V. Hypotheses

Our primary hypotheses revolve around factors expected to explain changes in small-business lending following the onset of the crisis during 2008.

H1. *Small-business lending declined following the onset of the financial crisis.*

TABLE 2. Descriptive Statistics for Full Sample.

Variable	Median	Mean	Min.	Max.
Dependent variables				
Pct. Chg. Small Bus. Loans	0.064	0.111	−1.000	1.000
Pct. Chg. Small C&I Loans	0.059	0.125	−1.000	1.000
Pct. Chg. Small CRE Loans	0.072	0.156	−1.000	1.000
Chg. Ratio Small Bus. Loan to Assets	0.000	0.033	−1.000	1.000
Chg. Ratio Small C&I Loan to Assets	−0.010	0.051	−1.000	1.000
Chg. Ratio Small CRE Loan to Assets	0.007	0.085	−1.000	1.000
Log of Small Bus. Loans	9.645	9.466	0.000	17.419
Log of Small C&I Loans	8.752	8.539	0.000	16.730
Log of Small CRE Loans	8.951	8.553	0.000	17.053
Pct. Chg. Bus. Loans	0.089	0.133	−1.000	1.000
Pct. Chg. C&I Loans	0.077	0.138	−1.000	1.000
Pct. Chg. CRE Loans	0.101	0.179	−1.000	1.000
Chg. Ratio Bus. Loans to Assets	0.021	0.052	−1.000	1.000
Chg. Ratio C&I Loans to Assets	0.006	0.063	−1.000	1.000
Chg. Ratio CRE Loans to Assets	0.033	0.105	−1.000	1.000
Log of Bus. Loans	9.802	9.722	0.000	19.173
Log of C&I Loans	8.863	8.738	0.000	18.633
Log of CRE Loans	9.121	8.832	0.000	18.300
Control variables				
Ratio of Small Bus. Loans to Assets	0.151	0.168	0.000	0.978
Ratio of Small C&I Loans to Assets	0.067	0.080	0.000	0.978
Ratio of Small CRE Loans to Assets	0.073	0.088	0.000	0.775
Ratio of Bus. Loans to Assets	0.195	0.218	0.000	0.978
Ratio of C&I Loans to Assets	0.080	0.096	0.000	0.978
Ratio of CRE Loans to Assets	0.097	0.122	0.000	0.857
Ratio of Equity to Assets	0.096	0.111	−0.062	1.000
Ratio of NPLs to Assets	0.008	0.014	0.000	0.467
Ratio of Net Income to Assets	0.011	0.010	−0.040	0.040
Ratio of Liq. Assets to Assets	0.333	0.354	0.000	1.000
Ratio of Bus. Commitments to Credit	0.056	0.067	0.000	0.993
Ratio Core Deposits to Assets	0.528	0.503	0.000	0.947
Log of Assets	11.360	11.511	4.682	21.232
De Novo	0.000	0.066	0.000	1.000
TARP indicators				
TARP × Postcrisis	0.000	0.016	0.000	1.000
TARP/Assets	0.000	2.021	0.000	235.802
TARP/Equity	0.000	20.678	0.000	2,606.425

Note: Descriptive statistics are for analysis variables from 1993 to 2011. Data are taken for each bank in each year from the June Federal Financial Institutions Examination Council (FFIEC) Call Report. The total number of observations is 151,597. For each variable, the table presents the median, mean, minimum, and maximum. Change variables are winsorized at 100%. Net income to assets is winsorized at −400 and +400 basis points. Variable definitions are provided in Table 1. TARP × Postcrisis, 1 if a bank received TARP injection during 2008-2009 and the year is after date of injection, and equal to zero otherwise.

We expect that small-business lending, in general, declined following the onset of the financial crisis as banks sought to boost their capital ratios by reducing bank loans in general and small-business loans in particular. This implies that the coefficients of the three year fixed effects corresponding to *Postcrisis* (2009, 2010, and 2011) in equation (1) are negative and significant.

H2. *Total business lending declined following the onset of the financial crisis.*

TABLE 3. Descriptive Statistics: TARP versus Non-TARP Banks.

	All Banks		Non-TARP		TARP			
Variable	Mean	SE	Mean	SE	Mean	SE	Diff.	*t*-Stat.
Dependent variables								
Pct. Chg. Small Bus. Loans	0.062	0.003	0.064	0.004	0.046	0.010	0.018	1.747
Pct. Chg. Small C&I Loans	0.048	0.004	0.049	0.005	0.042	0.013	0.007	0.497
Pct. Chg. Small CRE Loans	0.122	0.004	0.122	0.005	0.122	0.013	−0.001	−0.038
Chg. Ratio Small Bus. Loan to Assets	−0.006	0.003	−0.002	0.003	−0.044	0.008	0.042	4.840***
Chg. Ratio Small C&I Loan to Assets	−0.015	0.004	−0.011	0.004	−0.042	0.012	0.031	2.444*
Chg. Ratio Small CRE Loan to Assets	0.057	0.004	0.060	0.004	0.039	0.012	0.021	1.596
Log of Small Bus. Loans	9.925	0.021	9.780	0.020	11.103	0.081	−1.323	−15.832***
Log of Small C&I Loans	8.871	0.023	8.722	0.023	10.086	0.086	−1.364	−15.393***
Log of Small CRE Loans	9.192	0.025	9.049	0.025	10.358	0.090	−1.309	−14.058***
Pct. Chg. Bus. Loans	0.095	0.003	0.094	0.003	0.105	0.008	−0.011	−1.272
Pct. Chg. C&I Loans	0.052	0.004	0.051	0.004	0.063	0.012	−0.012	−0.941
Pct. Chg. CRE Loans	0.160	0.004	0.156	0.004	0.195	0.011	−0.039	−3.361***
Chg. Ratio Bus. Loans to Assets	0.023	0.002	0.025	0.003	0.006	0.006	0.019	2.844**
Chg. Ratio C&I Loans to Assets	−0.013	0.004	−0.011	0.004	−0.028	0.010	0.017	1.503
Chg. Ratio CRE Loans to Assets	0.092	0.004	0.091	0.004	0.101	0.010	−0.010	−0.940
Log of Bus. Loans	10.375	0.023	10.184	0.023	11.921	0.087	−1.737	−19.274***
Log of C&I Loans	9.184	0.025	8.995	0.025	10.714	0.093	−1.719	−17.935***
Log of CRE Loans	9.699	0.028	9.507	0.028	11.258	0.096	−1.751	−17.433***
Control variables								
Ratio of Small Bus. Loans to Assets	0.168	0.001	0.168	0.001	0.169	0.004	−0.001	−0.155
Ratio of Small C&I Loans to Assets	0.070	0.001	0.070	0.001	0.068	0.002	0.002	0.994
Ratio of Small CRE Loans to Assets	0.099	0.001	0.098	0.001	0.101	0.003	−0.003	−0.951
Ratio of Bus. Loans to Assets	0.262	0.002	0.252	0.002	0.342	0.005	−0.090	−16.129***
Ratio of C&I Loans to Assets	0.094	0.001	0.091	0.001	0.121	0.003	−0.030	−9.167***
Ratio of CRE Loans to Assets	0.168	0.001	0.161	0.001	0.222	0.004	−0.061	−13.597***
Ratio of Equity to Assets	0.119	0.001	0.120	0.001	0.114	0.003	0.006	1.668
Ratio of NPLs to Assets	0.022	0.000	0.022	0.000	0.021	0.001	0.001	1.741
Ratio of Net Income to Assets	0.007	0.000	0.007	0.000	0.004	0.000	0.003	6.918***
Ratio of Liq. Assets to Assets	0.289	0.002	0.299	0.002	0.207	0.005	0.092	17.296***
Ratio Bus. Commitments to Credit	0.081	0.001	0.077	0.001	0.108	0.002	−0.031	−12.513***
Ratio Core Deposits to Assets	0.429	0.002	0.442	0.002	0.323	0.005	0.119	23.235***
Log of Assets	11.940	0.016	11.777	0.015	13.262	0.064	−1.485	−22.626***
De Novo	0.091	0.003	0.087	0.004	0.119	0.011	−0.032	−2.631**

Note: Descriptive statistics (means and standard errors) are for analysis variables based on data from June 2009 Federal Financial Institutions Examination Council (FFIEC) Call Reports. Statistics are presented for all banks and separately for 6,481 non-TARP (Troubled Asset Relief Program) banks and 798 TARP banks that received capital injections by the time of their June 2009 Call Report. The last column reports the results of a *t*-test for differences in the means of the non-TARP and TARP banks. Change variables are measured from June 2008 to June 2009 and are winsorized at 100%. Other variables are measured as of June 2008. Net income to assets is winsorized at −400 and +400 basis points. Variable definitions are provided in Table 1.
***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.

We expect that business lending, in general, declined following the onset of the financial crisis as banks sought to boost their capital ratios by reducing bank loans. This implies that the coefficients of the three year fixed effects corresponding to *Postcrisis* (2009, 2010, and 2011) in equation (2) are negative and significant.

H3. *Small-business lending declined by a greater percentage than total business lending following the onset of the financial crisis.*

Following the onset of the financial crisis, we expect that small-business lending declined by a greater percentage than did total business lending as banks sought to boost their capital ratios by reducing bank loans in general and small-business loans in particular. We expect that banks would be more loyal to their large customers than to their small customers, and that this would be more pronounced at large banks than at small banks. This implies that the expected differences in the coefficients of the three year fixed effects corresponding to *Postcrisis* (2009, 2010, and 2011) in equations (1) and (2), that is, the differences in the change in small-business lending and the change in total business lending, are positive and significant.

H4. *The decline in small-business lending was smaller at TARP banks than at non-TARP banks following the onset of the financial crisis*

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We expect that banks that received TARP capital injections were able to boost their small-business lending relative to banks that did not receive TARP capital injections. This implies that the β_2 coefficient on $TARP \times Postcrisis$ is positive and significant.

VI. Results

Graphs and Descriptive Statistics

Figure VII graphs the median values of year-over-year changes in the nominal dollar value of total business loans for TARP and non-TARP banks. It shows that changes in business lending have been similar between the two sets of banks, with TARP banks increasing lending by slightly more each year. This trend ended in 2010 when loan growth at TARP banks was 0.1% compared to 1.0% at non-TARP banks. In the following year, business lending at TARP banks declined 1.3% compared with a 0.4% decline at non-TARP banks, as both groups were affected by the financial crisis.

Figures VIII and IX graph the median values of year-over-year changes in the nominal dollar value of total C&I loans and total CRE loans, respectively. Again, the graphs show the values for TARP and non-TARP banks. In Figure VIII, the recession following 2008 is clearly evident. In 2008, the growth in C&I loans reached 12.0% and 7.9% for TARP and non-TARP banks, respectively, which dropped to 0% and −1.1% for these two groups the next year. In 2010 and 2011, C&I loan growth at TARP banks declined by more than non-TARP banks. TARP bank loans declined by 6.4% in 2010 and another 4.3% in 2011, compared with declines of 2.6% and 2.1% at non-TARP banks in those years.

In Figure IX, changes in CRE lending exhibit relatively similar patterns over time between the two groups of banks, with TARP banks increasing lending by slightly more each year. Changes in lending converge during the crisis years. Loan growth at TARP banks increased 10.8% and 3.7% in 2009 and 2010, compared with 8.2% and 3.3% at non-TARP banks in those years. By 2011 CRE loan growth declined 0.5% at TARP banks, and there was no growth for non-TARP banks.

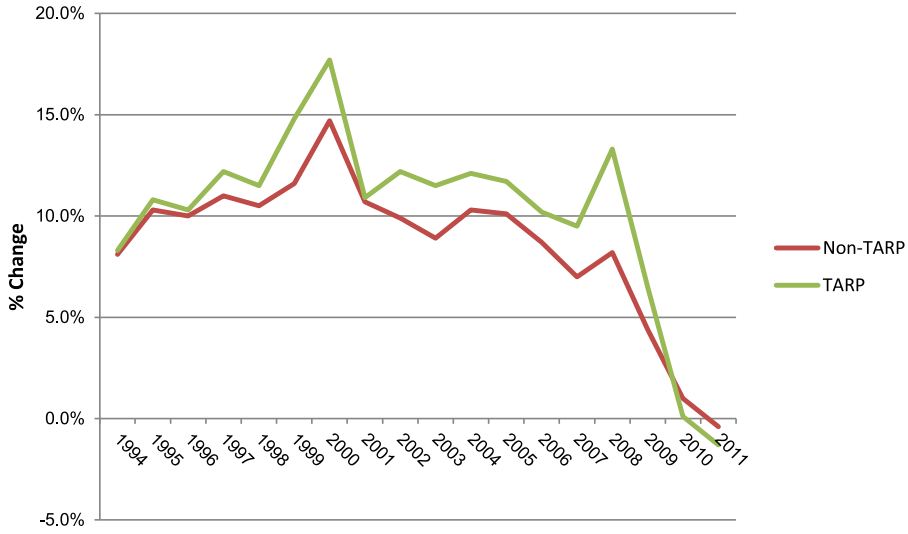

Figure VII. Change in Value of Total Business Loans. Troubled Asset Relief Program (TARP) banks versus non-TARP banks.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

Figure X graphs the median values of year-over-year changes in the nominal value of total small-business loans for TARP and non-TARP banks. From 1994 to 2008, small-business lending grew each year, even during the 2001–2003 recession, and between the two groups, changes were fairly similar over time. After the 2008 crisis, small-business lending declined precipitously. TARP banks reduced their loans by 2.6% in 2010 and 4.9% in 2011. Comparatively, the reduction at non-TARP banks

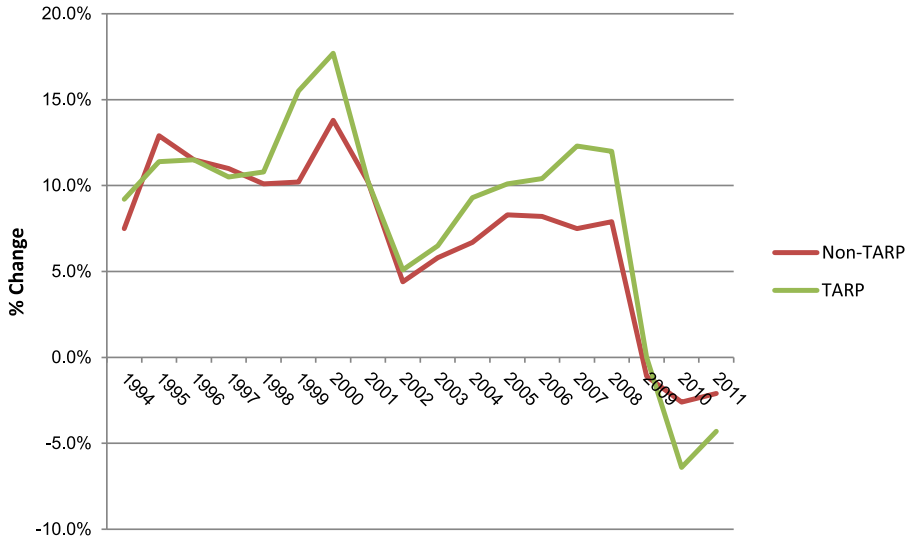

Figure VIII. Change in Value of Total Commercial and Industrial (C&I) Loans. Troubled Asset Relief Program (TARP) banks versus non-TARP banks.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

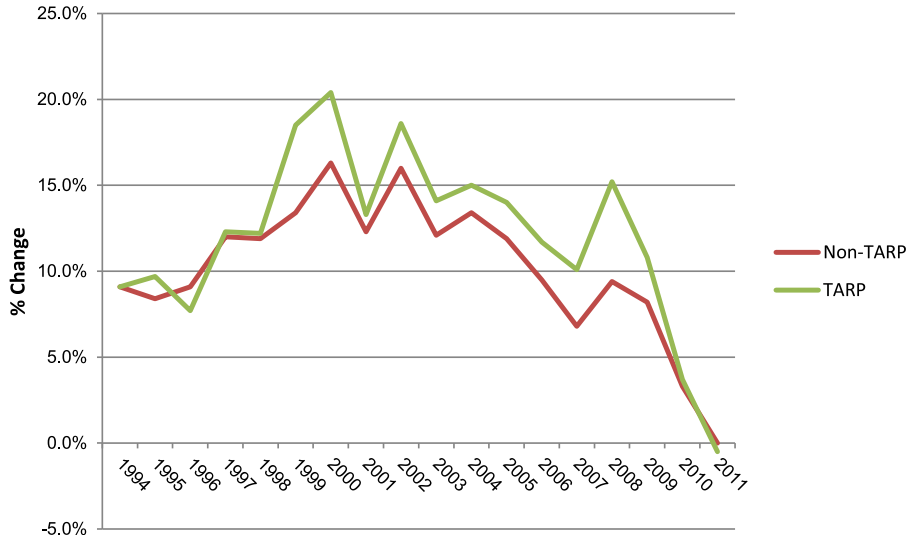

Figure IX. Change in Value of Total Commercial Real Estate (CRE) Loans. All banks and Troubled Asset Relief Program (TARP) banks versus non-TARP banks.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

was not as large, 0.7% and 2.2%, respectively. This relative decline was much greater than for business loans; hence, the impact of the financial crisis fell more heavily on small businesses than on larger firms.

Figures XI and XII separate total small business lending changes into two components: small C&I loans and small CRE loans, respectively. As shown in Figure XI,

Figure X. Change in Value of Total Small-Business Loans. Troubled Asset Relief Program (TARP) banks versus non-TARP banks.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

Figure XI. Change in Value of Small Business Commercial and Industrial (C&I) Loans. Troubled Asset Relief Program (TARP) banks versus non-TARP banks.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

the median values of year-over-year changes in small-business C&I lending had been positive each year until 2008 as banks grew their loan portfolios. Both TARP and non-TARP banks followed similar patterns of lending up until this time. Then in 2009, both groups strongly reduced their C&I lending, with TARP banks exhibiting a larger change

Figure XII. Change in Value of Small Business Commercial Real Estate (CRE) Loans. Troubled Asset Relief Program (TARP) banks versus non-TARP banks.
Source: Authors' calculations based on Call Report data. [Color figure can be viewed at wileyonlinelibrary.com]

by absolute magnitude. In 2008, TARP banks increased C&I lending by 5.5%, followed by reductions of 3.4%, 8.4%, and 7.4% in the subsequent three years. The change in lending at non-TARP banks was not nearly as severe, reaching a low point of −3.8% in 2011. For both sets of banks, the reduction in small-business C&I lending was greater than the reduction in total business C&I lending, as measured by percentage change; hence, small businesses were more severely affected than larger firms.

Figure XII shows that CRE loan growth was positive in every year of the sample until 2010 when it dropped below zero at TARP banks. Both sets of banks demonstrate similar patterns in lending over the years, with TARP banks reducing their CRE loans by slightly more after the crisis—particularly in 2011 when CRE lending declined 3.3% compared with 1.8% for non-TARP banks.

To summarize, these findings show that the financial crisis reduced lending to small businesses more than to larger firms. When we look at differences in lending by banks that did, and did not, receive capital injections from the TARP's CPP, we find that both total business lending and small-business lending declined more at TARP banks than at non-TARP banks. This strongly suggests that the TARP failed in one of its principal goals, to spur bank business lending, especially to small businesses.

Multivariate Analysis

In this section, we present results from our multivariate regression analysis of bank lending. We estimate a series of ordinary least squares regression models with both bank and year fixed effects that enable us to test for significant differences in lending by TARP and non-TARP banks following the onset of the financial crisis in 2008. We also include a set of control variables for the level of lending, firm size, capital adequacy, asset quality, earnings, liquidity, and loan commitments.

Table 4 presents results for the annual percentage change in lending, Table 5 presents the results for the annual change in the ratio of loans to assets, and Table 6 presents the results for the natural logarithm of loans. Each table presents results from a series of six regression models where the dependent variables are: (1) total small-business loans, (2) small C&I loans, (3) small CRE loans, (4) total business lending, (5) all C&I loans, and (6) all CRE loans. Each model includes a set of control variable measures as of the previous year, a set of year fixed effects (with 2007 being the omitted year), a set of bank fixed effects (not shown), and an interaction term between an indicator variable (*Postcrisis*) for 2009–2011 and an indicator for banks having received TARP funds before that year. These interaction terms enable us to test whether lending by TARP banks increased (or decreased) more than by non-TARP banks.

Percentage Change in Business Loans. In Table 4, we analyze the percentage change in business loans each year from 1994–2011. For each of the six models, the adjusted R^2 is greater than 0.24. By contrast, Berger and Udell (2004) report adjusted R^2s of less than 0.06. Our key variables of interest are the year fixed effects for 2009, 2010, and 2011, as well as the $TARP \times Postcrisis$ interaction term. The dummy for 2007 is omitted so the interpretation of the year coefficients is the percentage change in lending relative to 2007. For the year fixed effects, most of the coefficients for 2009, 2010, and 2011 are negative and significant at the 0.01 level or better in each of the six

TABLE 4. Loan Growth Tests: Annual Percentage Change in the Dollar Value of Loans.

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
2009	−0.013***	0.004	−0.053***	0.005	0.016***	0.005	0.004	0.003	−0.064***	0.005	0.040***	0.005
2010	−0.030***	0.004	−0.067***	0.005	−0.007	0.005	−0.015***	0.004	−0.071***	0.005	0.013***	0.005
2011	−0.046***	0.004	−0.069***	0.006	−0.033***	0.005	−0.025***	0.004	−0.063***	0.005	−0.007	0.005
TARP	0.002	0.010	−0.005	0.012	0.012	0.011	0.022**	0.009	0.011	0.011	0.032***	0.010
TARP × Postcrisis	−0.030***	0.007	−0.023***	0.009	−0.020**	0.008	−0.010*	0.006	−0.020**	0.008	0.010	0.007
Loans	−1.496***	0.028	−2.452***	0.066	−2.780***	0.042	−1.034***	0.023	−1.980***	0.049	−1.828***	0.035
Total Equity	0.194***	0.033	0.322***	0.037	0.197***	0.034	0.329***	0.031	0.413***	0.035	0.345***	0.033
NPLs	−1.895***	0.074	−1.966***	0.100	−1.424***	0.089	−1.982***	0.070	−1.992***	0.098	−1.573***	0.084
Net Income	−2.620***	0.171	−1.781***	0.203	−1.959***	0.187	−2.615***	0.157	−1.576***	0.196	−1.934***	0.174
Liquid Assets	−0.064***	0.014	0.005	0.017	−0.080***	0.016	0.004	0.014	0.058***	0.017	−0.033**	0.016
Core Deposits	−0.012	0.014	−0.072***	0.018	−0.009	0.017	−0.082***	0.013	−0.095***	0.017	−0.104***	0.017
Commitments	0.433***	0.041	0.397***	0.051	0.308***	0.042	0.663***	0.037	0.638***	0.042	0.463***	0.044
Bank Size	−0.134***	0.004	−0.134***	0.005	−0.125***	0.005	−0.074***	0.004	−0.101***	0.005	−0.055***	0.004
De Novo	0.139***	0.006	0.136***	0.007	0.111***	0.007	0.130***	0.005	0.137***	0.007	0.100***	0.006
1994	−0.097***	0.006	−0.060***	0.007	−0.102***	0.008	−0.073***	0.005	−0.063***	0.007	−0.063***	0.007
1995	−0.064***	0.006	−0.010	0.007	−0.092***	0.007	−0.058***	0.005	−0.021***	0.007	−0.076***	0.007
1996	−0.067***	0.005	−0.015**	0.007	−0.095***	0.007	−0.052***	0.005	−0.019***	0.006	−0.070***	0.007
1997	−0.047***	0.005	−0.010	0.006	−0.063***	0.007	−0.036***	0.005	−0.018***	0.006	−0.040***	0.007
1998	−0.036***	0.005	−0.005	0.006	−0.051***	0.007	−0.033***	0.004	−0.017***	0.006	−0.039***	0.006
1999	−0.027***	0.005	−0.004	0.006	−0.042***	0.006	−0.018***	0.004	−0.008	0.006	−0.024***	0.006
2000	0.009**	0.005	0.026***	0.006	−0.004	0.006	0.012***	0.004	0.018***	0.005	0.010*	0.006
2001	−0.018***	0.004	0.001	0.006	−0.030***	0.006	−0.016***	0.004	−0.006	0.005	−0.021***	0.005
2002	−0.001	0.004	−0.028***	0.005	0.023***	0.006	0.007*	0.004	−0.035***	0.005	0.041***	0.005
2003	−0.001	0.004	−0.019***	0.005	0.010*	0.006	−0.002	0.004	−0.030***	0.005	0.014***	0.005
2004	0.007*	0.004	−0.014***	0.005	0.027***	0.005	0.017***	0.003	−0.020***	0.005	0.042***	0.005
2005	0.022***	0.004	0.002	0.005	0.032***	0.005	0.026***	0.003	−0.003	0.005	0.040***	0.005

(Continued)

TABLE 4. ***(Continued)***

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
2006	0.017***	0.004	0.008	0.005	0.023***	0.005	0.013***	0.003	−0.004	0.004	0.021***	0.004
2008	0.008**	0.004	−0.003	0.005	0.015***	0.005	0.027***	0.003	0.005	0.005	0.035***	0.005
Obs.	151,597		151,596		151,597		151,597		151,597		151,597	
Bank fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Adj. R^2	0.243		0.268		0.238		0.287		0.281		0.249	

Note: Results are from an ordinary least squares fixed-effects model with both time and bank fixed effects, where the dependent variable is the annual percentage change in the dollar value of bank lending in one of six business loan categories: total small-business loans; small commercial and industrial (C&I) loans, small commercial real estate (CRE) loans, total business loans, total C&I loans, and total CRE loans. Total business loans is defined as the sum of C&I loans and CRE loans to be consistent with bank reporting of small-business loans. The analysis is based on 151,597 bank-year observations for 12,922 banks from 1994 to 2011 gathered from the June Federal Financial Institutions Examination Council (FFIEC) Call Reports. *Loans* is the ratio of loans in the loan category of the dependent variable to total assets. *Total Equity is* the ratio of total equity to total assets. *NPLs* is the ratio of nonperforming assets to total assets. *Net Income* is the ratio of net income to total assets. *Core Deposits* is the ratio of core deposits to total assets. *Commitments* is the ratio of business loan commitments to total credit, which is defined as the sum of total assets and total loan commitments. *Bank Size* as measured by the log of total assets. *De Novo* is an indicator for de novo banks less than five years old. Each bank control variable is measured as of year $t-1$. All time fixed effects are relative to the omitted year 2007. *TARP* × *Postcrisis* are interactions between time fixed effects from 2009–2011 and an indicator for 864 banks that received capital injections during late 2008–2009 as part of the Troubled Asset Relief Program's (TARP) Capital Purchase Program. Bank fixed effects are included in each model but are not shown. The *t*-statistics are based on robust standard errors clustered at the bank level.

***Significant at the 1% level.

**Significant at the 5% level.

*Significant at the 10% level.

TABLE 5. Loan Growth Tests: Annual Percentage Change in the Ratio of Bank Loans to Total Assets.

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
2009	−0.025***	0.004	−0.062***	0.005	0.004	0.005	−0.008**	0.003	−0.072***	0.005	0.026***	0.004
2010	−0.043***	0.004	−0.079***	0.005	−0.020***	0.005	−0.028***	0.003	−0.083***	0.005	−0.000	0.005
2011	−0.064***	0.004	−0.086***	0.005	−0.048***	0.005	−0.041***	0.003	−0.079***	0.005	−0.021***	0.005
TARP	−0.015*	0.009	−0.021**	0.010	−0.001	0.010	0.002	0.007	−0.005	0.010	0.015*	0.009
TARP × *Postcrisis*	−0.022***	0.006	−0.012	0.008	−0.010	0.008	0.003	0.005	−0.008	0.008	0.027***	0.007
Loans	−1.671***	0.027	−2.678***	0.064	−3.040***	0.043	−1.194***	0.020	−2.179***	0.046	−2.017***	0.034
Total Equity	0.153***	0.028	0.245***	0.035	0.182***	0.034	0.327***	0.026	0.362***	0.033	0.362***	0.032
NPLs	−0.352***	0.060	−0.589***	0.086	0.012	0.082	−0.353***	0.052	−0.598***	0.084	−0.054	0.073
Net Income	−1.832***	0.147	−1.089***	0.186	−1.692***	0.181	−1.915***	0.131	−0.923***	0.178	−1.855***	0.170
Liquid Assets	0.134***	0.013	0.195***	0.016	0.105***	0.016	0.209***	0.013	0.255***	0.016	0.164***	0.016
Core Deposits	0.016	0.013	−0.047***	0.017	0.006	0.017	−0.057***	0.011	−0.068***	0.017	−0.097***	0.016
Commitments	−0.012	0.035	−0.019	0.046	−0.083**	0.040	0.182***	0.029	0.191***	0.037	0.037	0.041
Bank Size	−0.048***	0.003	−0.054***	0.004	−0.051***	0.004	0.016***	0.003	−0.020***	0.004	0.023***	0.004
De Novo	0.044***	0.005	0.049***	0.007	0.030***	0.007	0.026***	0.004	0.046***	0.006	0.012*	0.006
1994	−0.064***	0.005	−0.023***	0.007	−0.075***	0.008	−0.043***	0.005	−0.029***	0.006	−0.038***	0.007
1995	−0.032***	0.005	0.024***	0.006	−0.066***	0.007	−0.029***	0.004	0.010	0.006	−0.051***	0.007
1996	−0.049***	0.005	0.007	0.006	−0.083***	0.007	−0.036***	0.004	−0.001	0.006	−0.059***	0.007
1997	−0.037***	0.005	0.003	0.006	−0.058***	0.007	−0.030***	0.004	−0.008	0.006	−0.038***	0.006
1998	−0.031***	0.005	0.004	0.006	−0.051***	0.007	−0.031***	0.004	−0.011*	0.005	−0.041***	0.006
1999	−0.023***	0.004	0.004	0.006	−0.041***	0.006	−0.017***	0.004	−0.002	0.005	−0.026***	0.006
2000	0.016***	0.004	0.036***	0.005	−0.002	0.006	0.016***	0.004	0.026***	0.005	0.009*	0.006
2001	−0.013***	0.004	0.008	0.005	−0.031***	0.006	−0.013***	0.004	−0.001	0.005	−0.024***	0.005
2002	−0.008**	0.004	−0.029***	0.005	0.011**	0.006	−0.005	0.003	−0.038***	0.005	0.026***	0.005
2003	−0.020***	0.004	−0.034***	0.005	−0.012**	0.005	−0.025***	0.003	−0.047***	0.005	−0.012**	0.005
2004	0.007*	0.004	−0.011**	0.005	0.023***	0.005	0.014***	0.003	−0.019***	0.005	0.034***	0.005
2005	0.015***	0.004	−0.004	0.005	0.023***	0.005	0.017***	0.003	−0.010**	0.004	0.028***	0.005

(Continued)

TABLE 5. ***(Continued)***

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
2006	0.015***	0.004	0.005	0.005	0.018***	0.005	0.009***	0.003	−0.008*	0.004	0.014***	0.004
2008	−0.005	0.004	−0.017***	0.005	0.003	0.005	0.011***	0.003	−0.009**	0.004	0.021***	0.004
Obs.	151,597		151,596		151,597		151,597		151,597		151,597	
Bank fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Adj. R^2	0.179		0.266		0.231		0.192		0.275		0.226	

Note: Results are from an ordinary least squares fixed-effects model with both time and bank fixed effects, where the dependent variable is the annual change in the dollar value of bank lending in one of six business loan categories: total small-business loans; small commercial and industrial (C&I) loans, small commercial real estate (CRE) loans, total business loans, total C&I loans, and total CRE loans. Total business loans is defined as the sum of C&I loans and CRE loans to be consistent with bank reporting of small-business loans. The analysis is based on 151,597 bank-year observations for 12,922 banks from 1994 to 2011 gathered from the June Federal Financial Institutions Examination Council (FFIEC) Call Reports. *Loans* is the ratio of loans in the loan category of the dependent variable to total assets. *Total Equity is* the ratio of total equity to total assets. *NPLs* is the ratio of nonperforming assets to total assets. *Net Income* is the ratio of net income to total assets. *Core Deposits* is the ratio of core deposits to total assets. *Commitments* is the ratio of business loan commitments to total credit, which is defined as the sum of total assets and total loan commitments. *Bank Size* as measured by the log of total assets. *De Novo* is an indicator for de novo banks less than five years old. Each bank control variable is measured as of year $t-1$. All time fixed effects are relative to the omitted year 2007. *TARP* × *Postcrisis* are interactions between time fixed effects from 2009–2011 and an indicator for 864 banks that received capital injections during late 2008–2009 as part of the Troubled Asset Relief Program's (TARP) Capital Purchase Program. Bank fixed effects are included in each model but are not shown. The *t*-statistics are based on robust standard errors clustered at the bank level.

***Significant at the 1% level.

**Significant at the 5% level.

*Significant at the 10% level.

TABLE 6. Loan Growth Tests: Log of Dollar Value of Loans.

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
2009	−0.017***	0.006	−0.063***	0.009	0.037***	0.011	0.003	0.006	−0.071***	0.008	0.067***	0.010
2010	−0.026***	0.007	−0.070***	0.009	0.018*	0.011	−0.009	0.007	−0.070***	0.009	0.040***	0.011
2011	−0.041***	0.008	−0.087***	0.010	0.011	0.011	−0.018**	0.007	−0.075***	0.009	0.039***	0.011
TARP	−0.023	0.025	−0.039	0.028	−0.083***	0.026	0.000	0.023	−0.015	0.026	−0.053**	0.025
TARP × Postcrisis	−0.054***	0.019	−0.049***	0.018	−0.082***	0.020	−0.038**	0.019	−0.040**	0.019	−0.057***	0.020
Loans	0.574***	0.017	0.636***	0.011	0.565***	0.009	0.627***	0.017	0.671***	0.010	0.593***	0.009
Total Equity	1.964***	0.133	2.026***	0.136	2.178***	0.146	2.298***	0.134	2.314***	0.140	2.432***	0.152
NPLs	−1.938***	0.167	−2.399***	0.198	−1.719***	0.197	−1.819***	0.152	−2.230***	0.172	−1.743***	0.188
Net Income	−3.495***	0.456	−3.294***	0.457	−6.216***	0.537	−3.831***	0.422	−3.280***	0.432	−6.682***	0.526
Liquid Assets	−0.247***	0.047	−0.087**	0.043	−0.291***	0.045	−0.104**	0.049	0.041	0.042	−0.198***	0.050
Core Deposits	−0.023	0.038	−0.078*	0.044	−0.045	0.050	−0.122***	0.039	−0.126***	0.045	−0.167***	0.051
Commitments	0.199*	0.105	0.413***	0.132	0.240**	0.112	0.507***	0.101	0.676***	0.114	0.451***	0.127
Bank Size	0.210***	0.017	0.157***	0.014	0.230***	0.014	0.247***	0.019	0.185***	0.014	0.293***	0.015
De Novo	0.069***	0.015	0.087***	0.014	0.096***	0.016	0.047***	0.013	0.075***	0.013	0.074***	0.015
1994	−0.221***	0.015	−0.164***	0.016	−0.304***	0.019	−0.208***	0.014	−0.165***	0.016	−0.298***	0.019
1995	−0.181***	0.014	−0.115***	0.015	−0.283***	0.018	−0.185***	0.013	−0.126***	0.014	−0.303***	0.018
1996	−0.178***	0.013	−0.107***	0.014	−0.276***	0.017	−0.171***	0.013	−0.108***	0.014	−0.281***	0.017
1997	−0.140***	0.012	−0.080***	0.014	−0.219***	0.016	−0.144***	0.011	−0.092***	0.013	−0.228***	0.016
1998	−0.119***	0.011	−0.060***	0.013	−0.186***	0.015	−0.129***	0.011	−0.074***	0.012	−0.207***	0.015
1999	−0.100***	0.010	−0.054***	0.012	−0.166***	0.015	−0.106***	0.010	−0.064***	0.012	−0.178***	0.014
2000	−0.051***	0.010	−0.008	0.011	−0.095***	0.014	−0.067***	0.010	−0.026**	0.011	−0.112***	0.014
2001	−0.059***	0.009	−0.015	0.011	−0.110***	0.013	−0.068***	0.009	−0.026**	0.011	−0.118***	0.013
2002	−0.039***	0.008	−0.043***	0.010	−0.043***	0.012	−0.046***	0.008	−0.059***	0.010	−0.044***	0.012
2003	−0.035***	0.007	−0.041***	0.009	−0.042***	0.011	−0.049***	0.007	−0.060***	0.009	−0.055***	0.011
2004	−0.022***	0.007	−0.037***	0.009	−0.003	0.010	−0.021***	0.007	−0.046***	0.009	0.000	0.010

(Continued)

TABLE 6. ***(Continued)***

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
2005	0.008	0.007	−0.021**	0.008	0.030***	0.009	0.005	0.006	−0.031***	0.008	0.027***	0.009
2006	−0.001	0.007	−0.010	0.008	0.020**	0.010	−0.009	0.006	−0.024***	0.008	0.015	0.009
2008	0.001	0.007	−0.016*	0.009	0.027**	0.011	0.021***	0.006	−0.002	0.009	0.054***	0.010
Obs.	151,597		151,595		151,597		151,597		151,597		151,597	
Bank fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Adj. R^2	0.946		0.925		0.923		0.963		0.941		0.940	

Note: Results are from an ordinary least squares fixed-effects model with both time and bank fixed effects, where the dependent variable is the natural logarithm of the dollar value of bank lending in one of six business loan categories: total small-business loans; small commercial and industrial (C&I) loans, small commercial real estate (CRE) loans, total business loans, total C&I loans, and total CRE loans. Total business loans is defined as the sum of C&I loans and CRE loans to be consistent with bank reporting of small-business loans. The analysis is based on 151,597 bank-year observations for 12,922 banks from 1994 to 2011 gathered from the June Federal Financial Institutions Examination Council (FFIEC) Call Reports. *Loans* is the ratio of loans in the loan category of the dependent variable to total assets. *Total Equity is* the ratio of total equity to total assets. *NPLs* is the ratio of nonperforming assets to total assets. *Net Income* is the ratio of net income to total assets. *Core Deposits* is the ratio of core deposits to total assets. *Commitments* is the ratio of business loan commitments to total credit, which is defined as the sum of total assets and total loan commitments. *Bank Size* as measured by the log of total assets. *De Novo* is an indicator for de novo banks less than five years old. Each bank control variable is measured as of year $t-1$. All time fixed effects are relative to the omitted year 2007. *TARP* × *Postcrisis* are interactions between time fixed effects from 2009–2011 and an indicator for 864 banks that received capital injections during late 2008–2009 as part of the Troubled Asset Relief Program's (TARP) Capital Purchase Program. Bank fixed effects are included in each model but are not shown. The *t*-statistics are based on robust standard errors clustered at the bank level.

***Significant at the 1% level.

**Significant at the 5% level.

*Significant at the 10% level.

models. The TARP bank indicator is not significant in most of our models, meaning that before the crisis, TARP bank lending was not statistically different from lending by non-TARP banks.

For total small-business loans, the coefficients indicate that the percentage declines in lending were 1.3% in 2009, 3.0% in 2010, and 4.6% in 2011 relative to the precrisis year 2007. Each of these coefficients is statistically significant at better than the 0.01 level, so these results strongly support H1—that small-business lending declined following the onset of the financial crisis in 2008. For small C&I loans, the coefficients indicate that the percentage declines in lending were 5.3% in 2009, 6.7% in 2010, and 6.9% in 2011. Each of these coefficients is statistically significant at better than the 0.01 level. For small CRE loans, the coefficients indicate that the percentage declines in lending were 0.7% in 2010 and 3.3% in 2011; however, for 2009, lending actually increased by 1.6%. This is probably due to drawdowns on previously committed lines of credit following the crisis rather than to new lending.

For total business loans, the coefficients indicate that the percentage declines in lending were 1.5% in 2010 and 2.5% in 2011 relative to the start of the crisis in 2007. Each of these coefficients is statistically significant at better than the 0.01 level. For 2009, lending increased slightly by a statistically insignificant 0.4%. Looking over the entire three-year period, the results support H2—that all business lending declined following the onset of the financial crisis in 2008.

For all C&I loans, the coefficients indicate that the percentage declines in lending were 6.4% in 2009, 7.1% in 2010, and 6.3% in 2011; each coefficient is statistically significant at better than the 0.01 level. For all CRE loans, the coefficients indicate that lending increased by a statistically significant 4.0% in 2009 and 1.3% in 2010. In 2011, the coefficient indicates that lending declined by a statistically insignificant 0.7%. Again, these results are likely due to drawdowns of previously committed lines of credit that obligated the banks to lend to these borrowers even after the onset of the financial crisis.

When we compare the sum of the three year coefficients for total small-business lending with those of all business lending, we find that loans to small businesses declined by more than loans to all businesses, and that this difference is statistically significant at better than the 0.01 level. This evidence supports H3—that the decline in business lending to small firms was more severe than the overall decline in business lending to all firms. With respect to C&I loans, small firms appear to have fared about the same, as the difference in lending is not significant; however, small firms fared much worse with respect to CRE lending.

Next, we turn to the *Postcrisis* × *TARP* interaction term. In each of the three small-business lending regressions, the coefficients are negative and significant at the 0.05 level or better. Hence, the results provide strong evidence against H4—that TARP banks reduced their lending to small businesses by less than non-TARP banks after receiving capital injections. In fact, banks receiving TARP capital injections reduced their lending to small businesses by about 2% to 3% more per year than did other banks. Given that TARP banks were significantly larger than non-TARP banks, the economic significance of these reductions in lending is of even greater importance.

For the total and C&I business lending models, the coefficients for the interaction term are negative and significant at the 0.10 level. Total business lending declined by 1.0% in 2009 and total C&I lending declined by 2.0% more at TARP banks than at non-TARP banks during the postcrisis years. The interaction term for the change in CRE lending is positive but not significant. In other words, TARP banks did not exhibit CRE lending patterns that were significantly different from other banks during this period.

When we compare the $TARP \times Postcrisis$ coefficients for small-business lending to those of total business lending, we find that the TARP banks decreased the former by three times as much as the latter. This difference was primarily due to CRE lending rather than C&I lending.

Among our control variables, we find that coefficients on the ratio of loans to assets, where "loans" corresponds to each of the six dependent variables (e.g., small-business loans, small C&I loans, small CRE loans, etc.), are negative and highly significant in each of the six regressions. This is consistent with mean reversion to a target loan-to-asset ratio.

Coefficients on the ratio of total equity to total assets are positive and highly significant in each of the six regressions, indicating that better capitalized banks increased their lending by more than less well capitalized banks. This refutes industry claims that higher capital ratios adversely affect business lending.

Coefficients on the ratio of nonperforming loans to total assets are negative and significant in each of the six regressions, indicating that worse asset quality leads to less lending. This is consistent with research showing that banks with asset quality problems tend to shed assets rather than grow assets, typically by curtailing new lending.

Coefficients on the ratio of net income to assets are negative and highly significant in each of the six regressions, indicating that less profitable banks increase lending by more than more profitable banks. This is consistent with the existence of moral hazard due to deposit insurance; unprofitable banks double down by increasing their portfolio risk through increased business lending.

Coefficients on the ratio of liquid assets to total assets are negative and significant for small CRE loans and for total CRE loans, indicating that more liquid banks change CRE lending by more than less liquid banks. The coefficients for both small and total C&I lending are positive but only statistically significant for the latter, indicating that liquid banks increase C&I lending by more than less liquid banks. This may reflect the fact that CRE loans are typically longer in maturity than C&I loans and, hence, expose a bank to more funding, as we saw in 2008.

Coefficients on the ratio of core deposits to total assets are negative and significant in each of the three business lending regressions, but only significant for C&I loans among the three small-business lending regressions. In general, this indicates that banks that rely more on core deposits for funding increase business lending by less than other banks.

Coefficients on the ratio of business loan commitments to total credit are positive and highly significant in each of the six regressions, indicating that banks with

more loan commitments increase subsequent lending by more than banks with fewer loan commitments. This is consistent with the findings of Cornett et al. (2011).

Coefficients on bank size are negative and highly significant in each of the six regressions, indicating that larger banks increase lending by less than smaller banks. Moreover, the coefficient on bank size for small-business lending is almost twice as large as for total business lending. This is yet more evidence against allowing a small number of megabanks to control a growing share of industry assets, as small-business lending is negatively affected.

The indicator for de novo banks is positive and highly significant in each of the six regressions, consistent with our expectation that de novo banks increase lending by more than mature banks. This argues for policies that foster new banks, such as lower minimum capital requirements for a new bank charter and less onerous supervision during the de novo years. In fact, bank regulators increased the de novo supervisory period from three to seven years in 2009, only to reverse this policy in 2016.

Percentage Change in the Ratio of Business Loans to Total Assets. In Table 5, we analyze year-over-year changes in the ratio of business loans to total assets from 1994 to 2011. The adjusted R^2 for each of the six regressions is greater than 0.17.

For total small-business loans, the coefficients indicate that the declines in the loan-to-asset ratio were 2.5% in 2009, 4.3% in 2010, and 6.4% in 2011 relative to the start of the crisis in 2007. For small C&I loans, the coefficients indicate that the declines in the loan-to-asset ratio were 6.2% in 2009, 7.9% in 2010, and 8.6% in 2011. For small CRE loans, the coefficients indicate that the declines in the loan-to-asset ratio were 2.0% in 2010 and 4.8% in 2011 relative to the start of the crisis in 2007; for 2009, the ratio increased by a statistically insignificant 0.4%, most probably due to drawdowns of preexisting commitments. With the exception of the 2009 coefficient for CRE loans, each of the remaining eight coefficients is statistically significant at better than the 0.01 level. These results strongly support H1—that small-business lending declined following onset of the financial crisis in 2008.

For total business loans, the coefficients indicate that the declines in the loan-to-asset ratio were 0.8% in 2009, 2.8% in 2010, and 4.1% in 2011 relative to the start of the crisis in 2007. For all C&I loans, the coefficients indicate that the declines in the loan-to-asset ratio were 7.2% in 2009, 8.3% in 2010, and 7.9% in 2011. For all CRE loans, the coefficients indicate that the loan-to-asset ratio increased by 2.6% in 2009, as pre-existing commitments were drawn down. In 2011, the ratio declined by 2.1% after remaining essentially flat in 2010. With the exception of the 2009 coefficient for CRE loans, each of the remaining eight coefficients is statistically significant at better than the 0.01 level. These results strongly support H2—that total business lending declined following the onset of the financial crisis in 2008.

When we compare the sum of the three year coefficients for total small-business lending with those of all business lending, we find that the loan-to-asset ratio for small-business loans declined by more than the corresponding ratio for all business loans. This evidence supports H3—that the decline in business lending to small firms

was more severe than the overall decline in business lending to all firms. Within business lending, small firms appear to have fared about the same as all firms with respect to C&I lending but fared worse with respect to CRE lending.

Next, we turn to the *TARP* × *Postcrisis* interaction variable. In each of the three small-business lending regressions, the coefficient is negative, but only the coefficient for total small-business lending is statistically significant at better than the 0.01 level. These results provide strong evidence against H4—that TARP banks reduced their lending to small businesses by less than non-TARP banks after receiving capital injections.

For total business lending, the interaction coefficients are essentially zero and lack statistical significance for total business and C&I loans. For total CRE loans, the coefficient is positive and significant at the 0.01 level. This is the only evidence we can find of any increase in lending by TARP banks relative to non-TARP banks. When we compare the *TARP* × *Postcrisis* coefficients for small-business lending to those of total business lending, we find that the TARP banks decreased the former by more than two times as much as the latter.

With respect to the control variables, the results are largely consistent with what we observe in Table 4.

In summary, the results in Table 5 are generally consistent with those in Table 4, showing that TARP banks failed to increase lending to small businesses during the three years following implementation of the TARP. Instead, the evidence shows that TARP recipients reduced small-business lending by more than non-TARP banks.

Natural Logarithm of Business Loans. In Table 6, we analyze the natural logarithm of business loans in each of the six categories from 1994 to 2011. Because we include the lagged value of the dependent variable as an explanatory variable, this regression is equivalent to estimating the percentage change in lending but relaxing the constraint that the coefficient on the lagged dependent variable is equal to 1, as in Table 4. Because we are analyzing a logarithmic dependent variable, the interpretation of coefficients on the explanatory variables is the percentage change in lending for a one-unit change in the explanatory variable.

In each of these six regressions, the adjusted R^2 is greater than 0.92, which is primarily because we are now explaining the level of lending, rather than the change in the level of lending, coupled with a high degree of autocorrelation in the dependent variables.

For total small-business loans, each of the postcrisis year coefficients is negative and significant at better than the 0.01 level, indicating that the small-business loans declined by 1.7% in 2009, 2.6% in 2010, and 4.1% in 2011 relative to the start of the crisis in 2007. For small C&I loans, these year coefficients again are negative and significant at better than the 0.01 level, indicating that small C&I loans declined by 6.3% in 2009, 7.0% in 2010, and 8.7% in 2011. For small CRE loans, however, each of the coefficients is positive; 2009 is significant at better than 0.01, 2010 at better than 0.10, but 2011 is not significantly different from zero. These coefficients indicate that relative to 2007, small CRE loans increased by 3.7% and 1.8% in 2009 and 2010, respectively. However, it is important to note that small CRE lending peaked during 2009, as banks made good on preexisting commitments. In general, these results

support of H1—that small-business lending declined following the onset of the financial crisis in 2008. However, there are significant differences in C&I lending and CRE lending. There was a strong decline in the former and a slight increase in the latter.

For total business loans, the 0.003 coefficient for 2009 and −0.009 coefficient for 2010 are not significantly different from zero, whereas the −0.018 coefficient for 2011 is negative and significant at the 0.05 level. For all C&I loans, each of the three coefficients is negative and significant at better than the 0.01 level, indicating that C&I lending declined by 7.1% in 2009, 7.0% in 2010, and 7.5% in 2011 relative to 2007. For all CRE loans, however, each of the coefficients is positive and significant at better than the 0.01 level, indicating that CRE lending grew by 6.7% in 2009, 4.0% in 2010, and 3.9% in 2011 relative to 2007. Again, it is important to remember that all CRE lending peaked in 2009 because of takedowns of preexisting commitments.

When we compare the sum of the three year coefficients for total small-business lending with those of all business lending, we find that the log of small-business loans declined by more than the log of all business loans. This evidence supports H3—that the decline in business lending to small firms was more severe than to larger firms. Within business lending, small firms appear to have fared about the same as all firms in C&I lending and CRE lending.

Next, we turn to the $TARP \times Postcrisis$ interactions. Each of the three small-business coefficients is negative and significant at better than the 0.01 level. The magnitude of decline ranges from 4.6% to 8.2% for small-business C&I loans. In other words, TARP banks reduced small-business lending by significantly more than non-TARP banks. Consistent with the results in Tables 4 and 5, the results in Table 6 suggest that TARP banks not only failed to increase lending to small businesses during the three years following the CPP injections, but instead significantly reduced lending to small businesses by even more than non-TARP banks.

For all business lending, each of the interaction terms is negative and statistically significant at better than the 0.05 level. Again, this evidence suggests that TARP banks reduced business lending relative to non-TARP banks, although not as severely as small-business lending.

With respect to the control variables, the results are largely consistent with what we observe in Tables 4 and 5.

Controlling for Loan Demand. One potential explanation for our findings regarding TARP is that TARP banks were located in areas where loan demand was significantly lower than in the areas where non-TARP banks were located. Although this seems unlikely, we attempt to rule out this explanation by running a series of tests that include county-year fixed effects as well as bank fixed effects. We locate a bank by its headquarters and include fixed effects based on that locator value in our model. This leaves us with deviations from the county mean by year, which is equivalent to a within estimator. The results of these tests controlling for loan demand appear in Tables 7–9. Standard errors are clustered by county-year indicators.

One problem with this approach is that we have to exclude about 750 primarily rural banks that are the sole bank in a county, as we need at least two banks per county to calculate a meaningful deviation from the mean. There are almost no TARP banks

TABLE 7. Loan Growth Tests: Annual Percentage Change in the Dollar Value of Loans, Deviation from County Mean.

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
TARP	0.012	0.010	0.006	0.011	0.017	0.011	0.027***	0.008	0.024**	0.010	0.028***	0.010
TARP × *Postcrisis*	−0.015*	0.009	0.004	0.011	−0.004	0.010	−0.007	0.007	0.011	0.010	0.005	0.008
Loans	−1.664***	0.027	−2.661***	0.061	−3.017***	0.037	−1.107***	0.022	−2.116***	0.045	−1.941***	0.032
Total Equity	0.117***	0.031	0.228***	0.037	0.118***	0.033	0.228***	0.027	0.310***	0.034	0.231***	0.031
NPLs	−1.686***	0.085	−1.696***	0.104	−1.279***	0.101	−1.806***	0.071	−1.725***	0.099	−1.427***	0.089
Net Income	−2.287***	0.161	−1.645***	0.198	−1.584***	0.186	−2.170***	0.145	−1.438***	0.190	−1.334***	0.176
Liquid Assets	−0.073***	0.014	0.017	0.017	−0.090***	0.016	0.014	0.014	0.070***	0.016	−0.031*	0.016
Core Deposits	−0.023	0.016	−0.094***	0.019	−0.021	0.018	−0.088***	0.013	−0.115***	0.018	−0.108***	0.017
Commitments	0.319***	0.044	0.316***	0.052	0.191***	0.044	0.581***	0.037	0.584***	0.045	0.366***	0.042
Bank Size	−0.149***	0.004	−0.144***	0.005	−0.144***	0.005	−0.098***	0.004	−0.111***	0.005	−0.089***	0.004
De Novo	0.110***	0.006	0.113***	0.007	0.083***	0.007	0.114***	0.005	0.117***	0.007	0.090***	0.007
Obs.	138,017		138,016		138,017		138,017		138,017		138,017	
Bank fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
County × year fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Adj. R^2	0.234		0.262		0.240		0.287		0.282		0.257	

Note: Results are from an ordinary least squares fixed-effects model with both time and bank fixed effects, where the dependent variable is the annual percentage change in the dollar value of bank lending in one of six business loan categories: total small-business loans; small commercial and industrial (C&I) loans, small commercial real estate (CRE) loans, total business loans, total C&I loans, and total CRE loans. Total business loans is defined as the sum of C&I loans and CRE loans to be consistent with bank reporting of small-business loans. The analysis is based on 151,597 bank-year observations for 12,922 banks from 1994 to 2011 gathered from the June Federal Financial Institutions Examination Council (FFIEC) Call Reports. *Loans* is the ratio of loans in the loan category of the dependent variable to total assets. *Total Equity is* the ratio of total equity to total assets. *NPLs* is the ratio of nonperforming assets to total assets. *Net Income* is the ratio of net income to total assets. *Core Deposits* is the ratio of core deposits to total assets. *Commitments* is the ratio of business loan commitments to total credit, which is defined as the sum of total assets and total loan commitments. *Bank Size* as measured by the log of total assets. *De Novo* is an indicator for de novo banks less than five years old. Each bank control variable is measured as of year $t-1$. All time fixed effects are relative to the omitted year 2007. *TARP* × *Postcrisis* are interactions between time fixed effects from 2009–2011 and an indicator for 864 banks that received capital injections during late 2008–2009 as part of the Troubled Asset Relief Program's (TARP) Capital Purchase Program. Bank fixed effects are included in each model but are not shown. The t-statistics are based on robust standard errors clustered at the bank level.

***Significant at the 1% level.

**Significant at the 5% level.

TABLE 8. Loan Growth Tests: Annual Percentage Change in the Ratio of Bank Loans to Total Assets, Deviation from County Mean.

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
TARP	0.001	0.009	−0.004	0.011	0.009	0.010	0.012	0.007	0.014	0.010	0.012	0.009
TARP × *Postcrisis*	−0.019**	0.008	0.004	0.010	−0.004	0.010	−0.010	0.006	0.008	0.009	0.006	0.008
Loans	−1.853***	0.024	−2.890***	0.056	−3.302***	0.037	−1.295***	0.020	−2.327***	0.040	−2.176***	0.031
Total Equity	0.128***	0.028	0.203***	0.035	0.142***	0.032	0.280***	0.026	0.317***	0.033	0.288***	0.030
NPLs	−0.378***	0.078	−0.545***	0.096	−0.051	0.099	−0.403***	0.059	−0.556***	0.090	−0.133	0.081
Net Income	−1.600***	0.151	−1.047***	0.195	−1.428***	0.183	−1.579***	0.132	−0.882***	0.181	−1.361***	0.172
Liquid Assets	0.139***	0.014	0.221***	0.017	0.109***	0.016	0.233***	0.013	0.284***	0.016	0.178***	0.016
Core Deposits	0.012	0.015	−0.058***	0.019	−0.001	0.018	−0.054***	0.013	−0.076***	0.018	−0.090***	0.017
Commitments	−0.074*	0.041	−0.050	0.050	−0.151***	0.045	0.151***	0.033	0.186***	0.042	−0.005	0.040
Bank Size	−0.045***	0.004	−0.048***	0.005	−0.056***	0.005	0.011***	0.003	−0.015***	0.004	0.002	0.004
De Novo	0.028***	0.005	0.038***	0.007	0.012*	0.007	0.022***	0.005	0.035***	0.007	0.014**	0.007
Obs.	138,017		138,016		138,017		138,017		138,017		138,017	
Bank fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
County × year fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Adj. R^2	0.164		0.257		0.234		0.188		0.273		0.237	

Note: Results are from an ordinary least squares fixed-effects model with bank fixed effects and county-year fixed effects, where the dependent variable is the annual change in the ratio of bank loans to total assets where bank loans is in one of six business loan categories: total small-business lending; small commercial and industrial (C&I) loans, small commercial real estate (CRE) loans, total business loans, total C&I loans, and total CRE loans. Total business loans is defined as the sum of C&I loans and CRE loans to be consistent with bank reporting of small-business loans. The analysis is based on 138,017 bank-year observations for 12,286 banks from 1994 to 2011 gathered from the June Federal Financial Institutions Examination Council (FFIEC) Call Reports. *Loans* is the ratio of loans in the loan category of the dependent variable to total assets. *Total Equity is* the ratio of total equity to total assets. *NPLs* is the ratio of nonperforming assets to total assets. *Net Income* is the ratio of net income to total assets. *Core Deposits* is the ratio of core deposits to total assets. *Commitments* is the ratio of business loan commitments to total credit, which is defined as the sum of total assets and total loan commitments. *Bank Size* as measured by the log of total assets. *De Novo* is an indicator for de novo banks less than five years old. Each bank control variable is measured as of year $t-1$. *TARP* × *Postcrisis* are interactions between time fixed effects from 2009–2011 and an indicator for 864 banks that received capital injections during late 2008–2009 as part of the Troubled Asset Relief Program's (TARP) Capital Purchase Program. Fixed effects are included in each model but are not shown. The *t*-statistics are based on robust standard errors clustered by county-year.

***Significant at the 1% level.

**Significant at the 5% level.

TABLE 9. Loan Growth Tests: Log of Dollar Value of Loans, Deviation from County Mean.

	Small Bus. Lending		Small C&I Lending		Small CRE Lending		Bus. Lending		C&I Lending		CRE Lending	
Variable	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE	Coef.	SE
TARP	−0.007	0.023	−0.043*	0.025	−0.048*	0.026	0.018	0.021	−0.006	0.024	−0.026	0.023
TARP × *Postcrisis*	−0.042**	0.020	−0.050**	0.022	−0.057**	0.024	−0.039**	0.018	−0.042*	0.022	−0.039*	0.024
Loans	0.546***	0.017	0.606***	0.011	0.527***	0.009	0.592***	0.018	0.637***	0.011	0.561***	0.010
Total Equity	1.987***	0.112	2.043***	0.120	2.132***	0.125	2.280***	0.115	2.317***	0.122	2.340***	0.137
NPLs	−1.854***	0.201	−1.973***	0.225	−1.812***	0.240	−1.594***	0.175	−1.664***	0.206	−1.643***	0.209
Net Income	−2.583***	0.493	−2.416***	0.521	−5.378***	0.511	−2.919***	0.460	−2.472***	0.507	−5.647***	0.509
Liquid Assets	−0.187***	0.045	−0.053	0.043	−0.244***	0.044	−0.025	0.047	0.102**	0.042	−0.114**	0.048
Core Deposits	−0.042	0.041	−0.092**	0.045	−0.105**	0.050	−0.123***	0.037	−0.131***	0.045	-0.225***	0.050
Commitments	0.018	0.127	0.211	0.146	0.053	0.123	0.411***	0.123	0.539***	0.130	0.283**	0.143
Bank Size	0.217***	0.017	0.171***	0.015	0.255***	0.015	0.252***	0.019	0.205***	0.016	0.297***	0.016
De Novo	0.037**	0.014	0.069***	0.017	0.027	0.017	0.025*	0.014	0.067***	0.016	0.021	0.017
Obs.	138,017		138,015		138,017		138,017		138,017		138,017	
Bank fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
County × year fixed effects	Yes		Yes		Yes		Yes		Yes		Yes	
Adj. R^2	0.940		0.920		0.922		0.960		0.936		0.940	

Note: Results are from an ordinary least squares fixed-effects model with bank fixed effects and county-year fixed effects, where the dependent variable is the natural logarithm of the dollar value of bank lending in one of six business loan categories: total small-business loans; small commercial and industrial (C&I) loans, small commercial real estate (CRE) loans, total business loans, total C&I loans, and total CRE loans. Total business loans is defined as the sum of C&I loans and CRE loans to be consistent with bank reporting of small-business loans. The analysis is based on 151,597 bank-year observations for 12,922 banks from 1994 to 2011 gathered from the June Federal Financial Institutions Examination Council (FFIEC) Call Reports. *Loans* is the ratio of loans in the loan category of the dependent variable to total assets. *Total Equity is* the ratio of total equity to total assets. *NPLs* is the ratio of nonperforming assets to total assets. *Net Income* is the ratio of net income to total assets. *Core Deposits* is the ratio of core deposits to total assets. *Commitments* is the ratio of business loan commitments to total credit, which is defined as the sum of total assets and total loan commitments. *Bank Size* as measured by the log of total assets. *De Novo* is an indicator for de novo banks less than five years old. Each bank control variable is measured as of year $t-1$. All time fixed effects are relative to the omitted year 2007. *TARP* × *Postcrisis* are interactions between time fixed effects from 2009–2011 and an indicator for 864 banks that received capital injections during late 2008–2009 as part of the Troubled Asset Relief Program's (TARP) Capital Purchase Program. Fixed effects are included in each model but are not shown. The t-statistics are based on robust standard errors clustered by county-year.

***Significant at the 1% level.

**Significant at the 5% level.

*Significant at the 10% level.

among these observations, meaning these banks exhibited higher than average loan growth. Their exclusion weakens our distinction between lending by TARP and non-TARP banks but does allow us to control for differences in yearly loan demand at the county level.

As shown in Tables 7–9, our main results are qualitatively unchanged by including county-year fixed effects, although the differences in lending between TARP and non-TARP banks are weaker, especially for total business lending. We continue to find no evidence that TARP banks increased lending to small businesses after receiving capital injections. Each of the coefficients of interest on the $TARP \times Postcrisis$ interactions is either not significantly different from zero or is negative and significant. In Table 9, all six coefficients are negative and significant, suggesting that after controlling for local demand, TARP bank lending declined to all businesses no matter the size. The adjusted R^2s for the deviation models reported in Tables 7–9 are comparable to those with the time fixed-effects dummies reported in Tables 4–6.

VII. Robustness Tests

In this section, we conduct a series of robustness tests, the results of which appear in the Online Appendix. For each robustness test, we estimate three sets of regressions to match our analysis in Tables 4–6. All models predict our six dependent variables: (1) total small-business loans, (2) small C&I loans, (3) small CRE loans, (4) total business lending, (5) all C&I loans, and (6) all CRE loans.

Instrument Variable Analysis

First, we address potential endogeneity in the assignment of TARP CPP funding. It is possible that banks with certain attributes were given funding over other banks, which could have prompted them to exhibit the lending patterns we observe. To control for endogeneity, we conduct an instrument variable (IV) analysis following the literature (Li 2013; Duchin and Sosyura 2014; Berger and Roman 2015, 2017; Berger, Roman, and Sedunov 2020; Berger, Makaew, and Roman 2019).

In our first-stage regression, we instrument the TARP bank dummy variable (*TARP*) with a dummy variable called *Political Subcommittee*. Previous research has found that in many cases, a bank's political connections were influential in it being awarded TARP funding. Following these studies, *Political Subcommittee* indicates whether a bank was headquartered in a congressional district where the House of Representatives member served on either the subcommittee for Financial Institutions or Capital Markets in 2008 or 2009.[19] These two subcommittees were influential in

[19]Following Berger and Roman (2015), among other studies, we use ABLE/Geocorr2k software, which can be found on the Missouri Census Data Center website (http://mcdc.missouri.edu/) to match banks to congressional districts by the zip codes of their headquarters. We lose about 6% of our bank-year observations in this match process, a problem identified in prior studies.

establishing the Emergency Economic Stabilization Act and recommending policy measures related to TARP funding. The subcommittee instrument variable satisfies the exclusion restriction, in that the assignment of congressional members to the Financial Institutions or Capital Markets subcommittee would not have directly affected bank business or small-business lending patterns.

We estimate our first-stage IV regressions with a probit model using the *Political Subcommittee* instrument with our bank-level controls and fixed effects to predict the likelihood of a bank receiving TARP funding. The estimated coefficient for our IV is significant at better than the 0.01 level as shown in Online Appendix Table A4. We use the predicted value of this model in our second-stage regressions that estimate bank lending. These results are presented in Online Appendix Tables A5–A7 and are robust to controlling for endogeneity in the assignment of TARP funding. We find that TARP banks reduced small-business lending in all three categories by even more than non-TARP banks, and in many cases, total business lending declined by more at these banks or remained the same by comparison.

Heckman Model for Selection Bias

Next, we control for section bias in the assignment of TARP funding with Heckman's (1979) two-stage selection model. Using the first-stage model from our IV regressions that instruments the TARP bank indicator with a *Political Subcommittee* measure, we calculate the inverse Mills ratio self-selection parameter *Lambda*, which is added to our second-stage models that predict bank lending.

The results of these second-stage estimations are presented in Online Appendix Tables A8–A10. We find that our main results are qualitatively unchanged. TARP banks exhibit lower or the same amount of loan growth to small businesses after the crisis compared with non-TARP banks. The inverse Mills ratio (*Lambda*) is not statistically significant in most of our model estimations, suggesting that self-selection is not a problem in the assignment of TARP banks.

Placebo Tests: Time and Random Assignment

To further support our use of a difference-in-differences methodology, we conduct two sets of falsification tests to ensure that our main results are not caused by other confounding factors (Angrist and Krueger 1999; Roberts and Whited 2013). We first assign the crisis period to random years, keeping the TARP bank assignment variable the same. Online Appendix Tables A11–A13 present these results using 2002–2004 as the crisis period and 1994–2004 as the total sample period. In almost all of these regressions, our interaction term between the false crisis period and TARP banks is not statistically significant, suggesting that the negative association between TARP funding and small-business business lending is specific to the 2009–2011 crisis period.

In our second group of placebo tests, we assign our treatment variable randomly to the sample of banks. There were 642 bank holding companies that received TARP funding from 2008 to 2009. This indicator is instead assigned at

random. The results of our main regressions using this false assignment are presented in Online Appendix Tables A14–A16. The coefficient for the false *TARP* × *Postcrisis* interaction term is not statistically significant in almost all of our models, demonstrating that TARP recipients represent a specific group of banks that comparatively reduced their small-business lending after receiving funding in the postcrisis years.

TARP Amount

Up until this point, we have applied an indicator variable to capture differences in lending by TARP banks in the postcrisis period. However, banks received different levels of funding from the CPP depending on several factors. Therefore, we run a set of regressions replacing the TARP indicator variable with the ratio of the dollar amount of TARP funding received by the bank holding company, scaled by holding company bank assets (Panel A) and separately, by holding company bank equity (Panel B) in Online Appendix Tables A17–A19. Descriptive statistics for these two variables are presented in Table 2. The regression results are robust to this alternate specification. We continue to find that TARP recipients did not increase their lending to small businesses after being awarded additional funding.

Other Specifications and Samples

To further demonstrate the strength of our results, we conduct several additional tests using other model specifications and samples. Although TARP participation was voluntary, at the beginning of the program on October 28, 2008, the eight largest financial institutions we required to accept $115 billion in funding from the U.S. government: Citibank, JPMorgan Chase, Wells Fargo, Bank of America, Goldman Sachs, Morgan Stanley, Bank of New York, and State Street. Therefore, we replicate our main regressions excluding these eight institutions. Our results, presented in Online Appendix Tables A20–A22, are just as strong, if not stronger, than for the full sample.

In Online Appendix Tables A23–A25, we split our sample of banks into the following categories by the dollar amount of bank assets adjusted for inflation to the year 2011: small banks (less than $1 billion), medium banks ($1–$3 billion), and large banks (greater than $3 billion). We find that medium and large banks reduced their small-business lending by more than their business lending in the postcrisis years, but that TARP funding did not lead to statistically different lending patterns in these two groups. Medium and large TARP banks did not increase lending to businesses. Meanwhile, small banks reduced both small and total business lending, with small TARP banks reducing small-business lending by significantly more than non-TARP small banks.

In Online Appendix Tables A26–A28, we demonstrate that our results are robust to clustering standard errors by bank and year.

In unreported analyses, we test alternative control variables. Following Berger and Udell (2004), we replace net income to total assets (ROA) with net income to total

equity (ROE) and replace nonperforming assets to assets with loan-loss reserves to assets. Next, we include dummy variables for primary regulator. These alternative control variables do not qualitatively change our results regarding business lending following the crisis. ROE has the same sign and general level of significance as ROA, as is the case with *Loss Reserves* and *NPLs*. The indicators for the Fed and OCC are both negative, and the indicator for OCC is highly significant, indicating that OCC banks grew small-business lending more slowly than did banks regulated by the FDIC and the Fed.

Next, we reduce our time horizon, first to 2000–2011 and then to 2005–2011. These alternative sample periods do not qualitatively change our results regarding C&I lending but do weaken the results regarding CRE lending. We find no evidence of TARP banks increasing lending to small businesses in these reduced samples.

Then, we remove from our sample the more than 300 banks that failed from 2007 to 2011. Again, this alternative sample does not qualitatively change our results regarding business lending.

Next, we remove from our sample any bank that does not appear in the sample for at least five years. Again, this alternative sample does not qualitatively change our results regarding business lending.

Finally, we remove de novo banks from our sample. Again, this alternative sample does not qualitatively change our results regarding business lending.

VIII. Summary, Conclusions, and Policy Relevance

In this article, we analyze how the financial crisis that began during 2008 affected U.S. bank lending to businesses and, in particular, to small businesses. We find that bank lending to businesses in the United States declined significantly following the crisis, and that it declined by significantly more for small firms than for larger firms. These results hold in both univariate and multivariate analyses.

We also find that banks receiving capital injections from the TARP's $200 billion CPP decreased their lending to businesses both large and small by even more than banks not receiving government capital. However, our evidence also suggests that this decrease was due in part to differences in loan demand across TARP and non-TARP banks. One of the key goals of the TARP was to boost business lending, especially to small businesses.

This article provides both academics and policy makers with new insights into how the financial crisis affected the availability of credit to small firms, and how to tailor macroeconomic policies, regulations, and taxes to help small businesses obtain needed credit. This is critically important because theory suggests that credit-constrained firms are smaller, less likely to hire new employees, and less likely to make new long-term investments that could improve economic growth. Policies that help these firms improve their capitalization should lead to higher growth in both employment and output (GDP).

Our analysis of how the TARP's CPP affected lending to small businesses by banks that did, or did not, receive capital injections from the program provides

important new evidence on the track record of the CPP in one of its key stated goals—to increase bank lending, in general, and small-business lending, in particular. Our findings show that the TARP's CPP failed to increase small-business lending at participating banks beyond what we observed at nonparticipating banks.

Our analysis also reveals some other interesting results unrelated to lending during the crisis but that provide important new evidence on the determinants of business lending. First, we find a strong and significant positive relation between bank capital adequacy and business lending. This has important policy implications for regulators who are considering proposals to increase minimum capital requirements, especially for systemically important institutions. Our results suggest that higher capital requirements would lead to more business lending rather than less business lending, as the U.S. banking lobby has claimed.

Second, we find a strong and significant negative relation between bank size and business lending. This has important policy implications for regulators who are considering proposals to limit and/or reduce the size of the nation's largest banks. Our new evidence suggests that proposals to reduce the size of the largest banks would likely lead to more business lending.

Third, we find a strong and significant negative relation between bank profitability and business lending. Our new evidence is consistent with moral hazard induced by deposit insurance, which leads unprofitable banks to increase their risk exposure so as to exploit the subsidy from deposit insurance.

Fourth, we find a strong and significant positive relation between our indicator for de novo banks and business lending. Our new evidence complements existing studies of lending by de novo banks and suggests that regulators should enact policies to encourage the formation of new banks as one way to increase business lending.

Appendix

TABLE A1. Legislative Efforts to Boost Capital Available to Small Businesses.

Legislation	Status	Details
Panel A. Access to Capital Efforts		
H.R. 1424 (PL110-343) Emergency Economic Stabilization Act of 2008	Enacted October 3, 2008	Created the Troubled Asset Relief Program (TARP)
H.R. 1 (PL111-5): American Recovery and Reinvestment Act of 2009	Enacted February 17, 2009	Among other things, included $375 million for a 90% guaranty on 7(a) loans with an authority for "12 months after date of enactment [February 17, 2010]," fee waivers for borrowers on 7(a) loans, and fee waivers for borrowers and first lien lenders on 504 loans with authority through September 30, 2010
H.R. 2847 (PL111-147): Jobs Bill 1–Hiring Incentives to Restore Employment (HIRE) Act	Enacted March 18, 2010	Contained nothing for the Small Business Administration (SBA)
H.R. 5297 (PL111-240): Jobs Bill 3–Small Business Jobs Act	Enacted September 27, 2010	Among other things, included $505 million in appropriations for higher guaranty and fee waivers through the calendar year, December 31, 2010
Panel B. Extender Legislation in Congress		
H.R. 3326 (PL111-118): Extender 1–Department of Defense Appropriations Act, 2010	Enacted December 19, 2009	Included $125 million for the SBA Recovery Act higher guaranty and fee waivers, and extended the authority for the higher guaranty from "12 months after enactment [February 17, 2010]" to February 28, 2010
H.R. 4691 (PL111-144): Extender 2–Temporary Extension Act of 2010	Enacted March 2, 2010	Included $60 million for the SBA Recovery Act higher guaranty and fee waivers, and extended the authority for the higher guaranty from February 28, 2010 to March 28, 2010
H.R. 4851 (PL111-150): Extender 3–To Extend the Small Business Loan Guarantee Program	Enacted March 26, 2010	Gives access to $30 million existing SBA funds to continue SBA ARRA 7(1) and 504 provisions and extends guaranty authority to April 30, 2010
H.R. 4938 (PL111-157): Extender 4–Continuing Extension Act of 2010	Enacted April 15, 2010	Gives additional $80 million SBA finds to continue SBA ARRA 7(a) and 504 provisions, and extends guaranty authority to May 31, 2010
H.R. 3082 (PL111-322): Extender 6–Continuing Appropriations and Surface Transportation Extensions Act of 2011	Enacted December 22, 2010	Extends SBA fee waivers and the 90% guaranty for 7a loans from December 31, 2010 to March 4, 2011 or until the funds are exhausted, whichever occurs first
H.R. 1540 (PL112-81): SBIR/STTR Reauthorization Act of 2011 Amendment 1115 to the National Defense Authorization Bill	Enacted December 31, 2011	Increased allocations so over six years this nondilutive funding will grow from roughly $2.5 billion to an estimated $3.4 billion
H.R. 3606 (PL112-106): Jumpstart Our Business Startups Act	Enacted April 5, 2012	Numerous proposals including crowd funding and enactments to foster more initial public offerings

TABLE A2. Selected June Call Report Data for FDIC-Insured Banks by Year and Bank Size ($billions).

Variable	1994	1995	1996	1997	1998	1999	2000	2001	2002
< $100M									
Number	6,105	5,712	5,279	4,952	4,603	4,280	4,171	3,991	3,727
Total Assets	204,772	198,477	189,686	183,663	174,450	166,492	169,404	169,403	162,567
Loans	111,982	111,895	108,233	107,959	103,874	98,290	104,631	105,058	100,115
C&I Loans	17,574	17,199	16,917	16,984	16,463	15,772	17,049	17,645	16,301
CRE Loans	14,956	14,738	14,036	14,074	13,588	13,366	15,039	15,628	16,361
Small Bus. Loans	31,526	31,009	29,940	29,848	28,741	27,678	30,495	31,247	30,293
Small C&I Loans	17,122	16,810	16,449	16,407	15,878	15,099	16,390	16,766	15,405
Small CRE Loans	14,404	14,199	13,491	13,441	12,863	12,579	14,105	14,482	14,889
$100M–$300M									
Number	3,299	3,164	3,134	3,025	3,013	2,966	2,875	2,794	2,816
Total Assets	364,560	360,502	369,305	366,392	371,973	377,183	381,689	381,567	393,144
Loans	206,392	211,564	220,844	224,883	228,867	234,659	247,436	247,104	253,722
C&I Loans	32,758	33,848	35,766	36,329	37,483	39,054	41,472	41,088	40,651
CRE Loans	38,290	38,630	40,974	42,420	43,486	47,048	52,044	53,111	59,939
Small Bus. Loans	63,109	64,686	67,191	68,137	69,706	72,587	77,413	77,525	80,321
Small C&I Loans	29,774	30,955	32,171	32,348	33,218	34,192	35,950	35,599	34,401
Small CRE Loans	33,335	33,731	35,020	35,789	36,488	38,395	41,463	41,926	45,919
$300M–$1B									
Number	1,198	1,192	1,152	1,160	1,177	1,175	1,190	1,228	1,279
Total Assets	394,975	404,702	405,127	421,363	434,575	442,009	464,431	494,698	529,020
Loans	236,829	249,007	248,936	264,038	267,941	277,661	303,257	323,377	343,621
C&I Loans	36,063	37,918	38,745	41,667	41,883	45,460	49,645	53,997	55,180
CRE Loans	44,508	46,701	47,604	52,198	55,094	61,193	69,463	78,123	90,744
Small Bus. Loans	56,855	60,286	60,528	65,038	67,941	72,899	79,244	84,921	90,516
Small C&I Loans	26,088	27,279	27,779	30,138	30,921	32,898	35,545	38,030	38,592
Small CRE Loans	30,767	33,008	32,749	34,899	37,021	40,001	43,700	46,891	51,924
$1B–$10B									
Number	495	482	466	450	445	449	425	422	419
Total Assets	974,236	997,698	950,124	930,056	913,307	927,225	925,928	932,235	926,630
Loans	595,148	637,717	610,174	584,347	573,289	573,958	577,390	591,364	564,640
C&I Loans	110,569	118,934	112,720	109,965	106,559	110,570	112,534	114,587	106,665

(Continued)

TABLE A2. ***(Continued)***

Variable	1994	1995	1996	1997	1998	1999	2000	2001	2002
CRE Loans	88,674	89,065	87,723	87,112	85,311	98,226	107,768	114,066	125,275
Small Bus. Loans	79,984	83,971	86,456	83,955	81,967	88,249	90,096	93,123	95,821
Small C&I Loans	41,588	42,610	44,066	42,406	41,814	43,950	45,677	47,335	49,209
Small CRE Loans	38,396	41,361	42,389	41,549	40,153	44,299	44,419	45,787	46,612
> $10B									
Number	98	103	107	91	92	96	100	101	104
Total Assets	2,163,976	2,417,581	2,721,271	3,098,632	3,527,137	3,797,540	4,311,024	4,674,758	5,025,697
Loans	974,903	1,166,488	1,352,647	1,556,366	1,771,664	1,973,360	2,351,882	2,488,612	2,582,948
C&I Loans	269,004	320,089	351,895	407,686	488,116	559,867	660,431	647,840	580,789
CRE Loans	105,376	118,925	132,851	147,596	167,137	187,931	222,887	239,891	264,128
Small Bus. Loans	76,737	90,458	104,064	119,840	140,379	152,671	178,319	193,459	204,881
Small C&I Loans	43,207	51,857	59,659	71,601	81,916	87,842	103,359	110,840	117,906
Small CRE Loans	33,530	38,601	44,405	48,239	58,463	64,829	74,959	82,619	86,975
All banks									
Number	11,195	10,653	10,138	9,678	9,330	8,966	8,761	8,536	8,345
Total Assets	4,102,520	4,378,961	4,635,513	5,000,106	5,421,443	5,710,450	6,252,477	6,652,660	7,037,059
Loans	2,125,254	2,376,670	2,540,833	2,737,593	2,945,635	3,157,929	3,584,595	3,755,514	3,845,046
C&I Loans	465,967	527,988	556,042	612,630	690,504	770,723	881,131	875,157	799,585
CRE Loans	291,804	308,060	323,187	343,399	364,616	407,764	467,202	500,820	556,447
Small Bus. Loans	308,211	330,410	348,178	366,818	388,734	414,084	455,567	480,276	501,833
Small C&I Loans	157,779	169,510	180,125	192,900	203,746	213,981	236,921	248,571	255,514
Small CRE Loans	150,433	160,900	168,053	173,918	184,988	200,103	218,646	231,706	246,319

Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011
< $100M									
Number	3,431	3,325	3,157	3,024	2,992	2,883	2,688	2,512	2,322
Total Assets	153,410	154,011	150,312	148,111	149,563	150,976	142,161	137,238	131,153
Loans	92,513	94,298	93,863	93,667	94,022	95,579	88,835	83,295	83,523
C&I Loans	14,700	14,739	14,534	14,119	14,210	14,572	12,701	11,529	10,343
CRE Loans	15,815	16,734	17,116	17,021	17,519	18,975	18,844	17,523	15,983
Small Bus. Loans	28,055	28,522	28,301	27,568	27,326	27,612	25,759	23,656	21,135

(Continued)

TABLE A2. ***(Continued)***

Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011
Small C&I Loans	13,821	13,674	13,333	12,975	12,787	12,718	11,205	10,147	9,061
Small CRE Loans	14,234	14,847	14,968	14,594	14,539	14,894	14,554	13,509	12,074
$100M–$300M									
Number	2,870	2,795	2,695	2,666	2,652	2,687	2,676	2,629	2,493
Total Assets	408,696	413,475	408,047	420,193	432,424	462,193	458,528	456,499	442,786
Loans	260,266	271,394	273,182	287,393	298,162	321,160	312,513	299,623	300,443
C&I Loans	40,993	41,840	41,280	43,023	44,989	48,123	44,691	41,239	37,947
CRE Loans	64,583	70,834	71,458	74,627	76,280	84,710	87,218	87,895	83,955
Small Bus. Loans	83,278	85,207	83,990	85,624	85,783	88,941	85,272	80,878	74,473
Small C&I Loans	34,698	34,569	33,761	34,255	34,777	35,715	33,110	30,191	27,312
Small CRE Loans	48,579	50,638	50,228	51,368	51,006	53,226	52,162	50,687	47,161
$300M–$1B									
Number	1,347	1,353	1,428	1,456	1,445	1,411	1,449	1,423	1,307
Total Assets	564,281	578,500	634,730	682,441	703,503	726,622	739,745	726,897	676,192
Loans	363,081	381,953	435,291	475,920	495,690	520,336	518,784	486,147	487,477
C&I Loans	55,744	56,806	61,757	65,447	68,143	72,522	70,493	63,835	58,727
CRE Loans	100,364	109,725	127,459	137,207	140,466	151,351	158,465	158,858	146,773
Small Bus. Loans	93,335	96,914	107,287	114,050	112,796	112,677	110,883	105,605	93,092
Small C&I Loans	37,603	38,752	41,173	43,448	43,380	43,596	42,058	38,433	33,390
Small CRE Loans	55,732	58,162	66,114	70,602	69,416	69,081	68,826	67,171	59,702
$1B–$10B									
Number	458	465	464	477	490	481	511	484	461
Total Assets	988,412	1,037,420	1,074,071	1,160,516	1,199,912	1,255,121	1,276,454	1,229,154	1,177,274
Loans	593,556	648,924	695,547	771,548	815,418	874,827	866,104	788,972	791,130
C&I Loans	105,883	113,731	117,907	133,272	139,734	149,223	136,103	124,266	123,651
CRE Loans	140,262	161,199	171,802	194,933	208,879	224,640	245,909	243,051	231,783
Small Bus. Loans	103,456	109,440	115,183	127,312	127,171	129,772	126,293	116,408	110,606
Small C&I Loans	50,944	51,293	53,195	59,695	57,449	57,207	51,023	45,383	42,825
Small CRE Loans	52,511	58,147	61,988	67,617	69,722	72,565	75,270	71,025	67,781
> $10B									
Number	108	102	97	103	99	88	91	88	84
Total Assets	5,729,264	6,214,408	6,742,798	7,503,506	8,227,943	9,140,109	9,454,351	9,670,490	9,959,669

(Continued)

TABLE A2. ***(Continued)***

Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011
Loans	2,888,384	3,174,356	3,479,823	3,837,781	4,152,852	4,512,750	4,694,500	4,756,131	4,769,140
C&I Loans	556,216	536,430	623,563	689,381	770,457	918,238	866,063	740,375	762,019
CRE Loans	284,727	309,537	339,121	379,901	432,795	458,398	503,148	506,142	484,876
Small Bus. Loans	208,614	217,615	224,664	233,936	279,391	300,477	297,571	278,358	243,628
Small C&I Loans	116,652	115,876	122,559	121,598	145,873	160,040	158,181	158,719	133,434
Small CRE Loans	91,962	101,739	102,105	112,339	133,518	140,437	139,390	119,640	110,195
All banks									
Number	8,214	8,040	7,841	7,726	7,678	7,550	7,415	7,136	6,667
Total Assets	7,844,062	8,397,814	9,009,958	9,914,767	10,713,345	11,735,022	12,071,240	12,220,278	12,387,074
Loans	4,197,800	4,570,925	4,977,707	5,466,309	5,856,145	6,324,652	6,480,735	6,414,170	6,431,713
C&I Loans	773,536	763,547	859,041	945,243	1,037,534	1,202,677	1,130,051	981,244	992,685
CRE Loans	605,752	668,029	726,955	803,689	875,939	938,074	1,013,584	1,013,468	963,370
Small Bus. Loans	516,738	537,697	559,425	588,491	632,467	659,479	645,779	604,905	542,934
Small C&I Loans	253,719	254,164	264,021	271,971	294,266	309,276	295,577	282,873	246,022
Small CRE Loans	263,018	283,533	295,404	316,520	338,201	350,204	350,202	322,032	296,912

Note: *Number* refers to the number of banks, and *Loans* is net loans (RCFD2122).

TABLE A3. Selected June Call Report Data for FDIC-Insured Banks by Year and Bank Size (% of industry assets).

Variable	1994	1995	1996	1997	1998	1999	2000	2001	2002
< $100M									
Number	6,105	5,712	5,279	4,952	4,603	4,280	4,171	3,991	3,727
Total Assets	5.0%	4.5%	4.1%	3.7%	3.2%	2.9%	2.7%	2.5%	2.3%
Loans	2.7%	2.6%	2.3%	2.2%	1.9%	1.7%	1.7%	1.6%	1.4%
C&I Loans	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%
CRE Loans	0.4%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%
Small Bus. Loans	0.8%	0.7%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.4%
Small C&I Loans	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%
Small CRE Loans	0.4%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
$100M–$300M									
Number	3,299	3,164	3,134	3,025	3,013	2,966	2,875	2,794	2,816
Total Assets	8.9%	8.2%	8.0%	7.3%	6.9%	6.6%	6.1%	5.7%	5.6%
Loans	5.0%	4.8%	4.8%	4.5%	4.2%	4.1%	4.0%	3.7%	3.6%
C&I Loans	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%
CRE Loans	0.9%	0.9%	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%
Small Bus. Loans	1.5%	1.5%	1.4%	1.4%	1.3%	1.3%	1.2%	1.2%	1.1%
Small C&I Loans	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%
Small CRE Loans	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.6%	0.7%
$300M–$1B									
Number	1,198	1,192	1,152	1,160	1,177	1,175	1,190	1,228	1,279
Total Assets	9.6%	9.2%	8.7%	8.4%	8.0%	7.7%	7.4%	7.4%	7.5%
Loans	5.8%	5.7%	5.4%	5.3%	4.9%	4.9%	4.9%	4.9%	4.9%
C&I Loans	0.9%	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
CRE Loans	1.1%	1.1%	1.0%	1.0%	1.0%	1.1%	1.1%	1.2%	1.3%
Small Bus. Loans	1.4%	1.4%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%
Small C&I Loans	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%
Small CRE Loans	0.7%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
$1B–$10B									
Number	495	482	466	450	445	449	425	422	419
Total Assets	23.7%	22.8%	20.5%	18.6%	16.8%	16.2%	14.8%	14.0%	13.2%
Loans	14.5%	14.6%	13.2%	11.7%	10.6%	10.1%	9.2%	8.9%	8.0%

(Continued)

TABLE A3. *(Continued)*

Variable	1994	1995	1996	1997	1998	1999	2000	2001	2002
C&I Loans	2.7%	2.7%	2.4%	2.2%	2.0%	1.9%	1.8%	1.7%	1.5%
CRE Loans	2.2%	2.0%	1.9%	1.7%	1.6%	1.7%	1.7%	1.7%	1.8%
Small Bus. Loans	1.9%	1.9%	1.9%	1.7%	1.5%	1.5%	1.4%	1.4%	1.4%
Small C&I Loans	1.0%	1.0%	1.0%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%
Small CRE Loans	0.9%	0.9%	0.9%	0.8%	0.7%	0.8%	0.7%	0.7%	0.7%
> $10B									
Number	98	103	107	91	92	96	100	101	104
Total Assets	52.7%	55.2%	58.7%	62.0%	65.1%	66.5%	68.9%	70.3%	71.4%
Loans	23.8%	26.6%	29.2%	31.1%	32.7%	34.6%	37.6%	37.4%	36.7%
C&I Loans	6.6%	7.3%	7.6%	8.2%	9.0%	9.8%	10.6%	9.7%	8.3%
CRE Loans	2.6%	2.7%	2.9%	3.0%	3.1%	3.3%	3.6%	3.6%	3.8%
Small Bus. Loans	1.9%	2.1%	2.2%	2.4%	2.6%	2.7%	2.9%	2.9%	2.9%
Small C&I Loans	1.1%	1.2%	1.3%	1.4%	1.5%	1.5%	1.7%	1.7%	1.7%
Small CRE Loans	0.8%	0.9%	1.0%	1.0%	1.1%	1.1%	1.2%	1.2%	1.2%
All banks									
Number	11,195	10,653	10,138	9,678	9,330	8,966	8,761	8,536	8,345
Total Assets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Loans	51.8%	54.3%	54.8%	54.8%	54.3%	55.3%	57.3%	56.5%	54.6%
C&I Loans	11.4%	12.1%	12.0%	12.3%	12.7%	13.5%	14.1%	13.2%	11.4%
CRE Loans	7.1%	7.0%	7.0%	6.9%	6.7%	7.1%	7.5%	7.5%	7.9%
Small Bus. Loans	7.5%	7.5%	7.5%	7.3%	7.2%	7.3%	7.3%	7.2%	7.1%
Small C&I Loans	3.8%	3.9%	3.9%	3.9%	3.8%	3.7%	3.8%	3.7%	3.6%
Small CRE Loans	3.7%	3.7%	3.6%	3.5%	3.4%	3.5%	3.5%	3.5%	3.5%

Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011
< $100M									
Number	3,431	3,325	3,157	3,024	2,992	2,883	2,688	2,512	2,322
Total Assets	2.0%	1.8%	1.7%	1.5%	1.4%	1.3%	1.2%	1.1%	1.1%
Loans	1.2%	1.1%	1.0%	0.9%	0.9%	0.8%	0.7%	0.7%	0.7%
C&I Loans	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%

(Continued)

TABLE A3. ***(Continued)***

Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011
CRE Loans	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%
Small Bus. Loans	0.4%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%
Small C&I Loans	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Small CRE Loans	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
$100M–$300M									
Number	2,870	2,795	2,695	2,666	2,652	2,687	2,676	2,629	2,493
Total Assets	5.2%	4.9%	4.5%	4.2%	4.0%	3.9%	3.8%	3.7%	3.6%
Loans	3.3%	3.2%	3.0%	2.9%	2.8%	2.7%	2.6%	2.5%	2.4%
C&I Loans	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
CRE Loans	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%
Small Bus. Loans	1.1%	1.0%	0.9%	0.9%	0.8%	0.8%	0.7%	0.7%	0.6%
Small C&I Loans	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%
Small CRE Loans	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%
$300M–$1B									
Number	1,347	1,353	1,428	1,456	1,445	1,411	1,449	1,423	1,307
Total Assets	7.2%	6.9%	7.0%	6.9%	6.6%	6.2%	6.1%	5.9%	5.5%
Loans	4.6%	4.5%	4.8%	4.8%	4.6%	4.4%	4.3%	4.0%	3.9%
C&I Loans	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.5%	0.5%
CRE Loans	1.3%	1.3%	1.4%	1.4%	1.3%	1.3%	1.3%	1.3%	1.2%
Small Bus. Loans	1.2%	1.2%	1.2%	1.2%	1.1%	1.0%	0.9%	0.9%	0.8%
Small C&I Loans	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%
Small CRE Loans	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.5%	0.5%
$1B–$10B									
Number	458	465	464	477	490	481	511	484	461
Total Assets	12.6%	12.4%	11.9%	11.7%	11.2%	10.7%	10.6%	10.1%	9.5%
Loans	7.6%	7.7%	7.7%	7.8%	7.6%	7.5%	7.2%	6.5%	6.4%
C&I Loans	1.3%	1.4%	1.3%	1.3%	1.3%	1.3%	1.1%	1.0%	1.0%
CRE Loans	1.8%	1.9%	1.9%	2.0%	1.9%	1.9%	2.0%	2.0%	1.9%
Small Bus. Loans	1.3%	1.3%	1.3%	1.3%	1.2%	1.1%	1.0%	1.0%	0.9%
Small C&I Loans	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.4%	0.4%	0.3%
Small CRE Loans	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.5%

(Continued)

TABLE A3. ***(Continued)***

Variable	2003	2004	2005	2006	2007	2008	2009	2010	2011
> $10B									
Number	108	102	97	103	99	88	91	88	84
Total Assets	73.0%	74.0%	74.8%	75.7%	76.8%	77.9%	78.3%	79.1%	80.4%
Loans	36.8%	37.8%	38.6%	38.7%	38.8%	38.5%	38.9%	38.9%	38.5%
C&I Loans	7.1%	6.4%	6.9%	7.0%	7.2%	7.8%	7.2%	6.1%	6.2%
CRE Loans	3.6%	3.7%	3.8%	3.8%	4.0%	3.9%	4.2%	4.1%	3.9%
Small Bus. Loans	2.7%	2.6%	2.5%	2.4%	2.6%	2.6%	2.5%	2.3%	2.0%
Small C&I Loans	1.5%	1.4%	1.4%	1.2%	1.4%	1.4%	1.3%	1.3%	1.1%
Small CRE Loans	1.2%	1.2%	1.1%	1.1%	1.2%	1.2%	1.2%	1.0%	0.9%
All banks									
Number	8,214	8,040	7,841	7,726	7,678	7,550	7,415	7,136	6,667
Total Assets	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Loans	53.5%	54.4%	55.2%	55.1%	54.7%	53.9%	53.7%	52.5%	51.9%
C&I Loans	9.9%	9.1%	9.5%	9.5%	9.7%	10.2%	9.4%	8.0%	8.0%
CRE Loans	7.7%	8.0%	8.1%	8.1%	8.2%	8.0%	8.4%	8.3%	7.8%
Small Bus. Loans	6.6%	6.4%	6.2%	5.9%	5.9%	5.6%	5.3%	5.0%	4.4%
Small C&I Loans	3.2%	3.0%	2.9%	2.7%	2.7%	2.6%	2.4%	2.3%	2.0%
Small CRE Loans	3.4%	3.4%	3.3%	3.2%	3.2%	3.0%	2.9%	2.6%	2.4%

Note: *Number* refers to the number of banks, and *Loans* is net loans (RCFD2122).

References

Aghion, P., and P. Howitt, 1988, *Endogenous Growth Theory*, 1st ed. (MIT Press, Cambridge, MA).

Amel, D., and T. Mach, 2017, The impact of the Small Business Lending Fund on community bank lending to small businesses, *Economic Notes* 46, 307–28.

Angrist, J., and A. Krueger, 1999, Empirical strategies in labor economics, in O. C. Ashenfelter and D. Card eds: *Handbook of Labor Economics*, 3A (North Holland, Amsterdam, Netherlands), 1277–1366.

Ashenfelter, O., and D. Card, 1985, Using the longitudinal structure of earnings to estimate the effect of training programs, *Review of Economics and Statistics* 67, 648–60.

Bassett, W., S. Demiralp, and N. Lloyd, 2020, Government support of banks and bank lending, *Journal of Banking & Finance* 112, 105177.

Berger, A., T. Makaew, and R. Roman, 2019, Do business borrowers benefit from bank bailouts? The effects of TARP on loan contract terms, *Financial Management* 48, 575–639.

Berger, A., N. Miller, M. Petersen, R. Rajan, and J. Stein, 2005, Does function follow organizational form? Evidence from the lending practices of large and small banks, *Journal of Financial Economics* 76, 237–69.

Berger, A., and R. Roman, 2015, Did TARP banks get competitive advantages? *Journal of Financial and Quantitative Analysis* 50, 1199–1236.

Berger, A., and R. Roman, 2017, Did saving Wall Street really save main street? The real effects of TARP on local economic conditions, *Journal of Financial and Quantitative Analysis* 52, 1827–67.

Berger, A., R. Roman, and J. Sedunov, 2020, Did TARP reduce or increase systemic risk? The effects of government aid on financial system stability, *Journal of Financial Intermediation* 43, 100810.

Berger, A., A. Saunders, J. Scalise, and G. Udell, 1998, The effects of bank mergers and acquisitions on small business lending, *Journal of Financial Economics* 50, 187–229.

Berger, A., and G. Udell, 1995, Relationship lending and lines of credit in small firm finance, *Journal of Business* 68, 351–81.

Berger, A., and G. Udell, 1996, Universal banking and the future of small business lending, in A. Saunders and I. Walter, eds.: *Financial System Design: The Case for Universal Banking* (Irwin, Burr Ridge, IL), 559–627.

Berger, A., and G. Udell, 1998, The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle, *Journal of Banking & Finance* 22, 613–73.

Berger, A., and G. Udell, 2004, The institutional memory hypothesis and the pro-cyclicality of bank lending behavior, *Journal of Financial Intermediation* 13, 458–95.

Black, L., and L. Hazelwood, 2013, The effect of TARP on bank risk-taking, *Journal of Financial Stability* 9, 790–803.

Chavaz, M., and A. Rose, 2019, Political borders and bank lending in post-crisis America, *Review of Finance* 23, 935–59.

Chu, Y., D. Zhang, and Y. E. Zhao, 2019, Bank capital and lending: Evidence from syndicated loans, *Journal of Financial and Quantitative Analysis* 54, 667–94.

Cole, R., 1998, The importance of relationships to the availability of credit, *Journal of Banking & Finance* 22, 959–97.

Cole, R., 2008, What do we know about the capital structure of privately held firms? Evidence from the Surveys of Small Business Finance. U.S. Small Business Administration Economic Research Study No. 324, Available at http://www.sba.gov/advo/research/rs324.pdf

Cole, R., 2009, Who needs credit and who gets credit? Evidence from the Surveys of Small Business Finance, in *Small Business in Focus: Finance* (Small Business Administration Office of Advocacy, Washington, DC), 95–133, Available at http://www.sba.gov/advo/research/09finfocus.pdf

Cole, R., 2010, Bank credit, trade credit, or no credit: Evidence from the Surveys of Small Business Finances, U.S. Small Business Administration Research Study No. 365, Available at http://www.sba.gov/advo/research/rs365.pdf

Cole, R., 2013, What do we know about the capital structure of privately held firms? Evidence from the Surveys of Small Business Finance, *Financial Management* 45, 777–813.

Cole, R., L. Goldberg, and L. White, 2004, Cookie-cutter versus character: The micro structure of small business lending by large and small banks, *Journal of Financial and Quantitative Analysis* 39, 227–51.

Cole, R., and T. Sokolyk, 2016, Who needs credit and who gets credit? Evidence from the Surveys of Small Business Finance, *Journal of Financial Stability* 24, 40–60.

Cole, R., and N. Walraven, 1998, Banking consolidation and the availability of credit to small businesses: Evidence from the 1993 National Survey of Small Businesses, Presented at the Conference on Consolidation in the Financial Services Industry, New York.

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

Duchin, R., and D. Sosyura, 2014, Safer ratios, riskier portfolios: Banks' response to government aid, *Journal of Financial Economics* 113, 1–28.

Ely, D., and K. Robinson, 2001, Consolidation, technology and the changing structure of bank's small business lending, *Economic and Financial Review*, Federal Reserve Bank of Dallas, First Quarter, 23–32.

Goldberg, L., and R. DeYoung, 1999, Youth, adolescence and maturity at banks: Credit availability to small businesses in an era of banking and consolidation, *Journal of Banking & Finance* 23, 463–92.

Goldberg, L., and L. White, 1998, De novo banks and lending to small businesses: An empirical analysis, *Journal of Banking & Finance* 22, 851–67.

Heckman, J. J. 1979, Sample selection bias as a specification error. *Econometrica: Journal of the econometric society* 153–161.

Imbens, G., and J. Wooldridge, 2007, What's new in econometrics? Differences in differences, NBER Summer Lecture Series, Available at http://www.nber.org/WNE/lect_10_diffindiffs.pdf

Ivashina, V., and D. Scharfstein, 2010, Bank lending during the financial crisis of 2008, *Journal of Financial Economics* 97, 319–38.

Jagtiani, J., and C. Lemieux, 2016, Small business lending: Challenges and opportunities for community banks, Federal Reserve Bank of Philadelphia Working Paper No. 16-08.

King, R. G., and R. Levine, 1993a, Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics* 108, 717–737.

King, R. G., and R. Levine, 1993b, Finance, entrepreneurship and growth. *Journal of Monetary Economics* 32, 513–542.

Kwan, S., 2010, Financial crisis and bank lending, Federal Reserve Bank of San Francisco Working Paper, Available at http://ssrn.com/abstract=1571595.

Li, L., 2013, TARP funds distribution and bank loan growth, *Journal of Banking & Finance* 37, 4777–92.

Mills, K., and B. McCarthy, 2014, The state of small business lending: Credit access during the recovery and how technology may change the game, Harvard Business School Working Paper No. 15-004.

Peek, J., and E. Rosengren, 1998, Bank consolidation and small business lending: It's not just bank size that matters, *Journal of Banking & Finance* 22, 799–819.

Petersen, M., and R. Rajan, 1994, The benefits of lending relationships: Evidence from small business data, *Journal of Finance* 46, 3–37.

Rajan, R. G., and L. Zingales, 1998, Power in a theory of the firm. *The Quarterly Journal of Economics*, 113, 387–432.

Roberts, M., and T. Whited, 2013, Endogeneity in empirical corporate finance, in G. M. Constantinides, M. Harris, and R. M. Stulz eds.: *Handbook of the Economics of Finance*, 2 (Amersterdam, Netherlands, North Holland), 493–572.

Schumpeter, J. A. 1934, The theory of economic development, translated by Redvers Opie. Harvard: Economic Studies, 46, 1600–0404.

Strahan, P., and J. Weston, 1998, Small business lending and the changing structure of the banking industry, *Journal of Banking & Finance* 22, 821–45.

Wendt, P., 1947, The availability of capital to small businesses in California, *Journal of Finance* 2, 43–54.

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