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## Article

# Commercial bank small business lending pre and post crisis

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## Commercial Bank Small Business Lending Pre and Post Crisis

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# Commercial Bank Small Business Lending Pre and Post Crisis

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## ABSTRACT

We analyze small business lending at U.S. commercial banks, how it has changed over time and how it differs by bank size. Specifically, we examine the impact of government policy intervention on small business lending in the aftermath of the financial crisis. We find several important results. First, we find that the Troubled-Asset Relief Program's (TARP) \$200 billion Capital Purchase Program (CPP) had little impact on the banks that received capital injections' small business lending. Second, the Small Business Loan Fund (SBLF) lending program appears to have been a success as banks participating in the loan fund increased their lending to small businesses. Finally, we find that financial turmoil had a substantial negative impact on lending to small businesses at community banks but not their large bank counterparts. This result suggests that the larger banks may have behaved in a manner consistent with too big to fail. Collectively, these results provide important insights for policy makers as they continue to deal with the credit access issues of small firms.

Keywords: small business lending, financial crisis, credit crunch, TARP, Small Business Loan Fund, financial stress

JEL Codes: G21, G18, G01, E58

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## I. Introduction

Small businesses are central to America's economic well-being with over 23 million small firms in existence, representing 54 percent of all sales and creating over 64 percent of all new jobs.<sup>1</sup> When the financial crisis struck, the economic engine of U.S. small businesses was hit especially hard by the banking industry decline due to their reliance on bank lending to fund their growth.<sup>2</sup> Instead of lending, banks focused on shedding risk and increasing capital. For example, from June 2009 to June 2010 the outstanding amount of commercial bank loans at U.S. banks declined 18 percent.<sup>3</sup> The precipitous decline in commercial bank lending was an important factor in prompting the U.S. government to intervene in financial markets in an attempt to stabilize the banking system and make credit available for businesses and consumers. Two of the most important programs implemented by the government in this effort were the Troubled-Asset Relief Program (TARP), initiated in late 2008, and the Small Business Lending Fund (SBLF), initiated in 2010.<sup>4</sup> The TARP's Capital Purchase Program (CPP) was intended to stabilize the U.S. financial system by improving the capital position of financial institutions.<sup>5</sup> As such, the U.S. Department of the Treasury injected more than \$200 billion of capital into more than 800 U.S. banking institutions. With regard to the SBLF, the main objective was to encourage small business lending and to promote economic growth in communities across the nation by providing capital to community banks and community development loan funds (CDLFs). Through the SBLF, the U.S.

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<sup>1</sup> According to the U.S. Small Business Administration (SBA), small businesses account for half of U.S. private sector employment and produced 64% of net job growth between 1993 and 2011. See [http://www.sba.gov/sites/default/files/FAQ\\_Sept\\_2012.pdf](http://www.sba.gov/sites/default/files/FAQ_Sept_2012.pdf).

<sup>2</sup> Large firms can rely on other sources of capital, including debt and equity markets. Small firms, however, are primarily reliant on bank credit. For example, Cole (2009) using data from the Federal Reserve 1993, 1998 and 2003 Surveys of Small Business Finances finds that about 60 percent of all small firms use some form of bank credit. Bitler, Robb and Wolken (2001) and Mach and Wolken (2006) document the reliance of small firms on banks for financing.

<sup>3</sup> Federal Deposit Insurance Corporation, Call Report data.

<sup>4</sup> The Small Business Jobs Act created the Small Business Lending Fund (SBLF).

<sup>5</sup> See the U.S. Department of the Treasury website (<http://www.treasury.gov/initiatives/financial-stability/Pages/default.aspx>).

Department of the Treasury invested over \$4.0 billion in 332 institutions including investments of \$3.9 billion in 281 community banks and \$104 million in 51 CDLFs.

Small business credit availability is one of the major issues policy makers have grappled with over time, especially during periods of financial stress when access to credit becomes constrained. The academic literature on small business credit availability (Petersen and Rajan, 1994; Cole, 1998; Berger and Udell, 2002; Strahan and Weston, 2007; and Cole, 2012) has focused extensively on this issue, as have financial regulators and policy makers. In fact, Section 2227 of the Economic Growth and Regulatory Paperwork Reduction Act of 1996 requires that the Board of Governors of the Federal Reserve System submit a report to Congress every five years detailing the extent of small business lending by all creditors.<sup>6</sup> Furthermore, to help monitor small business credit markets, commercial banks are required to detail on their report of condition and income (Call Reports), loans on their balance sheets with original amounts less than or equal to \$1 million. Although small business loans are defined by loan size and not the size of the borrower on the Call Report, in practice many of these loans are small business loans.

In this paper, we explore changes in commercial bank lending to small businesses during the 1994 – 2013 time period. Given the importance of small business lending to the U.S. economy noted earlier, and the severity of the financial crisis, we seek to assess how effective government policies were in influencing small business lending behavior. First, we extend the existing literature on economic uncertainty and stress by examining how economic and financial uncertainty impacted bank balance sheets in general, and bank lending in particular. Controlling for levels of financial stress is critically important when examining small business lending as small banks may be more susceptible to economic turmoil given their size and limited access to capital markets. Second, we examine the impact on small business lending of government policy responses to the financial crisis. More specifically, we examine the impact on small business lending of banks receiving TARP money versus those that did not and the effect on small business lending of banks receiving funds through the SBLF versus those that did not. In order

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<sup>6</sup> The latest report to Congress on small business credit availability by the Federal Reserve was conducted in 2012. See <http://www.federalreserve.gov/publications/other-reports/files/sbfreport2012.pdf>.

to better design future government financial policies, it is necessary to understand how and why certain policies have or have not been effective in the past.

We find several key results. First, bank lending to small businesses in the U.S. declined significantly following the crisis, and it declined by significantly more at larger banks. Second, we find that the two government policy initiatives to spur lending, TARP and the SBLF, had varying degrees of success in stimulating small business lending. The capital injections from the TARP's \$200 billion Capital Purchase Program generally had either no effect or a small but negative effect on small business lending, while the SBLF lending program appears to have been a success as both large and small bank participants significantly increased their lending to small firms. Finally, we find that financial turmoil had an extremely damaging impact on small business lending by community banks, while their large bank counterparts were largely unaffected.

The remainder of the paper is structured as follows. Section II summarizes the previous literature on bank lending, small business lending, TARP, the SBLF, and financial stress. Section III details the empirical specification we employ to analyze small business lending. Section IV provides descriptive statistics on small business lending, as well as other factors that might impact lending such as bank capital levels, bank structure, liquidity, the level of problem loans and measures of economic and financial distress. Section V provides the empirical results of our model and Section VI provides the policy implications and concluding remarks.

## **II. Previous Literature**

Small firm credit availability is the oil in the U.S. economic engine. The economic damage that disruptions to small firm credit availability have caused in the past attests to its importance to the U.S. economy. During the 1990's lending crunch, several researchers documented that business lending was negatively impacted by financial sector disruptions, such as widespread mergers of banks, capital shortfalls and bank failures, as well as macroeconomic and financial uncertainty. For example, Peek and Rosengren (1998a) found mixed evidence on the impact of banks mergers with some banks shrinking small business lending while others increased it. In addition, the effect of the consolidation in banking on the availability of credit to small-business borrowers has been examined in a number of studies (see, e.g., Peek and Rosengren, 1998b; Strahan and Weston, 1998; Berger et al., 1998; and Walraven, 1997). Furthermore, Hancock and Wilcox (1998) find that the 1990 bank capital crunch had a larger impact on smaller banks – and hence smaller borrowers. This is not particularly surprising as there is a significant body of research suggesting that bank capital has a significant impact on

lending (Bernanke and Lown, 1991; Berger and Udell, 1994; Bliss and Kaufman, 2002; Berrospide and Edge, 2010). With regard to bank failures, Jacques and Nigro (2000) conclude that bank failures lead to a destruction of relationships which reduced business lending. Finally, Quagliariello (2009), Baum et al. (2009) and Ibrahim and Shah (2012) provide evidence that macroeconomic or financial uncertainty can lead to significant reductions in bank lending.

There is also a significant body of research examining the advantages of small banks in lending to small firms, particularly the most opaque ones, due to small banks ability to attain and use “soft” information about the firm in lending decisions (e.g., Petersen and Rajan, 1994; Berger and Udell, 1995; and Degreyse and Van Caylsele, 1998). Alternatively, large banks have a comparative advantage in hard-information or transactional lending by relying on credit scoring, financial statement lending, or asset backed lending. Several empirical studies confirm the comparative advantage of large and small banks respectively, using hard and soft information to make lending decisions (e.g., Cole, Goldberg and White, 2004; Berger, Miller and Petersen, Rajan and Stein 2005).

In recent years, however, there has been a blurring of the lines between “hard” and “soft” information used by large and small banks. Berger, Cowan and Frame (2011) find that about half of all community banks now use consumer credit scores, with 86 percent of those banks relying solely on the credit score of the individual (not firm). Despite this increased reliance on credit scoring, smaller banks still typically only use credit scores as a part of the underwriting process.

A few distinct trends emerge from the literature on small business lending. Empirical evidence indicates that small banks lend proportionately more to small enterprises than their large bank counterparts (Nakamura, 1994; Keeton, 1995; Berger et al., 1995; Levonian and Soller, 1995; Berger and Udell, 1996; Peek and Rosengren, 1996; Strahan and Weston, 1996; Strahan and Weston, 1998; and Berger et al., 1999). In terms of the impact of mergers on lending, however, the results are mixed. For example, Peek and Rosengren (1996) and Berger et al. (1998) note that mergers reduced lending, while others (Whalen, 1995; Strahan and Weston, 1996; Strahan and Weston, 1998) come to the opposite conclusion. Reduced lending to small businesses can be mitigated by the creation of new banks if the de novo banks lend more to small business than their peers. For example, Goldberg and White (1998) find that de novo banks (defined as those in operation for less than three years) do make substantially more small business loans as a percentage of a bank’s total assets than their peers of roughly comparable size. DeYoung et al. (1999) extend this study and conclude that as the de



novo banks age they make proportionately fewer loans to small business while holding other factors constant. The formation of de novo banks appears to be important for small business lending in an era of bank consolidation. Unfortunately, in the years since the financial crisis there have been very few “de novo” banks, mainly due to the FDIC moratorium on approving deposit insurance applications.<sup>7</sup>

With regard to the financial crisis, there are a few papers in recent years that examine the impact on small business lending. Kwan (2010), for example, uses the Survey of Terms of Business Lending to analyze the impact of the crisis on loan pricing. Li (2011) focuses on whether banks that were involved in the Capital Purchase Program (CPP) increased or decreased total lending. She finds that banks involved in the CPP program boosted total lending by 6.41 percent per annum. Duchin and Sosyura (2013) analyze the impact of CPP approvals and denials on bank risk taking using micro-level data on mortgage applications and large corporate loan data from Dealscan. They conclude that banks approved under the CPP program made riskier loans and shifted investment portfolios toward riskier securities after being approved for government assistance.

Cornett et al. (2011) examine how the crisis impacted total lending, as opposed to small business lending, with a focus on bank liquidity management. They find that banks more dependent on funding sources other than core deposits and equity financing experienced greater reductions in lending. Black and Hazelwood (2011), focusing on the risk rating of banks’ commercial loans, find that TARP financial support increased risk taking behavior for large banks while reducing it for smaller banks. With regard to small business lending, Cole (2012) examines the impact of the financial crisis and documents several important findings.<sup>8</sup> First, he notes a strong statistical relationship between strong bank capital and small business lending. Second, he finds a negative relationship between bank size and small business lending that suggests that reducing the size of the largest banks might lead to more small business lending. Finally, Cole (2012)

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<sup>7</sup> In fact, the Wall Street Journal reported the opening of the Bank of Bird in Hand in Pennsylvania as the first de novo bank opening since the passage of the Dodd Frank Act in 2010. See “A Local Bank in Amish Country Flourishes Amid Dearth of Small Lenders,” Wall Street Journal, March 29, 2015.

<sup>8</sup> Ivashina and Sharfstein (2010) use Dealscan to assess the impact of the financial crisis on large syndicated credits that are often securitized and thus off the balance sheet. Cole’s paper is a complementary analysis for small loans.

finds no evidence that the TARP program increased lending to small firms; rather, his evidence suggests that TARP recipient banks cut back lending more than their non-TARP counterparts.

The research on the efficacy of the SBLF, however, is much more limited. Amel and Mach (2014) find that participating banks increased their small business lending by roughly 10 percent more than non-participating banks. The authors, however, focus solely on the SBLF and community banks.

This paper contributes to the existing literature on small business lending in two major ways. First, this is the first paper to our knowledge that analyzes the impact of two of the major policy responses to the financial crisis, TARP/CPP and SBLF, on small business lending. These results have important implications for policy makers in deciding how to best deal with small firm credit crunches and economic distress. Second, this paper examines the role of financial stress and turmoil on small business credit. Since financial stress is more likely to impact smaller firms than their larger counterparts, this is a major step forward in assessing small business credit availability. This issue is critically important for policy makers as more effective policy action could translate into a more efficient financial intermediation process.

### III. The Model

This section examines the determinants of banks' overall small business lending. We estimate a fixed-effects panel model of small business lending growth at U.S. banks. The model controls for several factors that previous empirical research has shown to be important determinants of bank lending.

The general specification of the model can be shown as:

$$\Delta SBL_{j,t} = \beta_j + \beta_t + \beta_1 SIZE_{j,t-1} + \beta_2 MULTI_{j,t-1} + \beta_3 CASH_{j,t-1} + \beta_4 LIQ_{j,t-1} + \beta_5 CAP_{j,t-1} + \beta_6 NI_{j,t-1} + \beta_7 NPL_{j,t-1} + \beta_8 DEP_{j,t-1} + \sum_{i=9}^{13} \beta_i TARP + \sum_{i=14}^{16} \beta_i SBLF + \beta_{17} STRESS + \omega_{i,j} \quad (1)$$

where  $\Delta SBL_{j,t}$  is the annual percentage change in small business lending for bank  $j$  during period  $t$  with  $\beta_j$  representing bank-specific effects and  $\beta_t$  representing time-specific effects. Hester and Pierce (1975) and Hancock, Laing, and Wilcox (1995) argue that bank-specific effects are significant and can be attributed to factors such as differences in management across banks and disparate risk preferences as well as the flow of information within banks. Time dummies are introduced to account for exogenous

time-specific shocks, such as changes in the bank regulatory environment that may have occurred during a given period. Furthermore, the time dummy for 1994 is omitted from equation (1) thereby making the parameter estimates on the time dummies for 1995 through 2013 the percentage change in lending relative to 1994.

In addition, the model specification in equation (1) suggests a host of other variables that can be used to explain changes in small business lending. These include:

SIZE = log of bank assets in period t-1.

MULTI = 1 if affiliated with a multibank holding company; 0 otherwise.

CASH = (cash/assets) period t-1.

LIQ = (liquid assets/assets) period t-1.

CAP = (equity capital/assets) period t-1.

NI = (net income/assets) period t-1.

NPL = (nonperforming loans/assets) period t-1.

DEP = (deposits/assets) period t-1.

TARP = 1 if Troubled Asset Relief Program recipient for years 2009 through 2013; 0 otherwise.

SBLF = 1 if Small Business Loan Fund recipient for years 2011 through 2013; 0 otherwise.

STRESS = financial stress in period t as measured by the Cleveland Federal Reserve Stability Index.

$\omega_{i,j}$  = disturbance term.

Equation (1) is a reduced-form specification of the equilibrium change in small business lending. Among the explanatory variables, bank size (SIZE) is included to account for the fact that large and small banks might face different lending opportunities, and as such have potentially different loan growth rates. During the recent financial crisis, SIZE may also reflect a preference on the part of depositors and investors for financial relationships with banks that are deemed “too big to fail” (Cole, 2012). In addition, MULTI is included to account for the possibility, consistent with Peek and Rosengren (1998a), that banks which are part of a multi-bank holding company exhibit different behavior with regard to their small business lending than banks which are independent.

Consistent with other studies of bank lending behavior, equation (1) also includes bank-specific variables to account for the health of the bank. Our equation contains two measures of internally generated funds, CASH and LIQ, a measure of capital adequacy (CAP), a measure of earnings (NI) and a variable to account for asset

quality – in this case nonperforming loans (NPL).<sup>9</sup> Each of these variables is measured relative to assets. A priori, the expected sign on capital adequacy, the two measures of internally generated funds, and net income are positive while the expected sign on nonperforming loans (NPL) is negative. Internally generated funds make it less costly for banks to expand lending activities (Jacques and Nigro, 2000). Furthermore, banks with significant income and capital levels are better able to expand lending activities (Berrospide and Edge, 2010), while banks with significant problem loans may suffer from risk overhang and choose to contract lending (DeYoung et al., 2015). Also included in equation (1) is DEP, defined as the ratio of core deposits to total assets. Consistent with Cornett et al. (2011), banks with access to more stable forms of funding, such as core deposits, would be expected to have higher levels of lending growth as they are less likely to be subject to liquidity shocks during a financial crisis.

One of the primary purposes of this paper is to examine the impact of TARP and the SBLF programs on small business lending. As noted earlier, TARP led to direct injections of capital into banks via the CPP program in an effort to stabilize the financial system, while the SBLF provided capital primarily to community banks to encourage small business lending. *Ceteris paribus*, an injection of capital strengthens a bank's balance sheet, thereby improving the capital position of the institution and allowing for the possibility of more lending. Therefore, assuming a positive relationship between bank capital and lending, we would expect banks receiving government capital injections to lend more than those that do not. Under this hypothesis, the parameter estimates on CPP and SBLF in equation (1) would be expected to be positive. This is consistent with research by Kapan and Minoiu (2013) that finds that banks with stronger balance sheets were better able to maintain overall lending during the financial crisis.

On the other hand, an injection of capital onto a bank's balance sheet does not guarantee an increase in lending as risk-averse banks, during a period of financial crisis, may instead use the additional capital to either meet minimum regulatory capital standards or increase the size of their buffer stock. If the costs associated with external equity financing are significantly large, and a bank's capital buffer is thin, then a bank may prefer reduced lending as a way of minimizing the possibility of a capital shortfall

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<sup>9</sup> Our variables to measure the financial health of a bank are similar to those used by bank regulators in the CAMELS system to judge the health of a bank. CAMELS stands for capital, asset quality, management, earnings, liquidity, and sensitivity to risk.

(Van Den Heuvel, 2002) or as a value-maximizing response to risk overhang (DeYoung et al., 2015). In this case, the parameter estimates on CPP and SBLF in equation (1) would be expected to be negative. Furthermore, there is reason to believe that a negative parameter estimate is more likely to be the case for CPP recipients than SBLF recipients. First, a majority of CPP funds were distributed to large banks, which tend to have thinner capital buffers than smaller banks. Second, the primary purpose of the SBLF capital injections was to encourage small business lending.<sup>10</sup> To accomplish this goal, the U.S. Treasury Department purchased Tier 1 preferred stock from banks, with the dividend rate payable on the stock being reduced the greater the increase in small business lending.<sup>11</sup> Thus, we argue that SBLF funds are more likely to have been used to increase small business lending, and the parameter estimate on SBLF in equation (1) is more likely to be positive than the parameter estimate on CPP.

Finally, following the existing literature on macroeconomic and financial turmoil and its impact on bank lending, equation (1) includes the variable STRESS to account for financial stress. During periods of financial stress, banks may experience significantly more noisy signals regarding the expected returns on loans and other financial assets (Quagliariello, 2009). Pritzsker (2010) argues that financial stress brings with it not only uncertainty regarding expected returns, but also uncertainty as to the probability distributions of financial assets and liabilities. If we assume the market value of bank capital is stochastic but regulatory capital requirements are fixed, then periods of financial stress may amplify the stochastic nature of the bank's capital position relative to the minimum capital requirements established by regulators. For small business lending, financial stress may be particularly acute, as information about small businesses is often opaque and small business loans are relatively illiquid and more difficult to securitize, particularly during a financial crisis (Wilcox, 2011). Thus, during periods of financial stress, small business loans may be subject to heightened credit risk as both their first and second moments become more difficult to ascertain. As a result, we would expect banks

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<sup>10</sup> Only banks with less than \$10 billion in assets were eligible to receive SBLF funds and banks with less than \$1 billion of assets were eligible to receive up to 5% of risk weighted assets in SBLF funding, while banks with between \$1 billion and \$410 billion in assets were able to receive up to 3% of risk weighted assets in SBLF funding.

<sup>11</sup> See [https://www.treasury.gov/resource-center/sb-programs/Documents/SBLF\\_Fact\\_Sheet\\_Final.pdf](https://www.treasury.gov/resource-center/sb-programs/Documents/SBLF_Fact_Sheet_Final.pdf) for more details.

to reduce small business lending during periods of heightened financial stress, thus yielding a negative parameter estimate on the STRESS variable in equation (1). This argument is consistent with work by Baum et al (2009) which shows that financial and macroeconomic uncertainty, measured using the conditional variance of certain macroeconomic variables, results in banks lowering their loan to asset ratios, as well as anecdotal evidence on commercial banks reducing the availability of business loans during the financial crisis (Goodman, 2008).

A priori, it is not clear whether the effect of financial stress and uncertainty on small business lending should be greater at small banks or large banks. On the one hand, small banks historically possess higher capital ratios and have more stable sources of funding than large banks, a finding which suggests that community banks would be less affected by financial stress and uncertainty. On the other hand, large banks often have more diversified portfolios of assets and greater access to funding via capital markets. Furthermore, large banks deemed too big to fail may benefit from implicit government bankruptcy protection. This suggests the effect of financial turmoil on small business lending may be lessened at large banks.

#### IV. The Data

This paper uses Call Report data on commercial banks during the time period 1994-2013.<sup>12</sup> As such, this paper brings together data from several sources. The primary source of data is the FFIEC financial reports of income and condition, better known as the Call Reports. As a result of the last banking crisis and to better assess small business credit availability, in 1992 the Call Report began collecting information on both the number and amount currently outstanding of small business loans on an annual basis.<sup>13</sup> To reduce the burden on banks, the loan schedules report information on the number and amount of commercial and industrial loans and commercial real estate loans by loan size (<\$100k, \$100k-\$250k and \$250k- \$1million).

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<sup>12</sup> The small business lending data from the call report was changed to quarterly in March 2010. We use annual data since, prior to March 2010, we can only calculate annual growth rates for bank small business lending.

<sup>13</sup> The SBA provides a more detailed description of the Call Report data. For example, see <https://www.sba.gov/advocacy/small-business-lending-united-states-2013>.

Figure 1 shows the trends in commercial bank small business lending using June Call Report data. While Figure 1 provides a snapshot of small business lending over time, it should be noted that the Call Report's small business lending data can be greatly influenced by mergers and acquisitions. To account for the impact of mergers on the balance sheet of acquiring banks, we merger adjust the data using the same method as Cole (2012). Adjusting for the impact of mergers and acquisitions, we can correctly measure changes in small business lending that are not the result of mergers.

What is noteworthy from Figure 1 is that during the financial crisis and corresponding recession, both large and small banks reduced their small business lending, resulting in a total decrease in small business lending of approximately \$137.5 billion during the 2009-2011 period. For the purposes of this study, we define a community bank as a bank with less than \$1 billion in assets.<sup>14</sup> But while small business lending decreased at both large and small banks, Figure 1 suggests the decrease at large banks was more severe than the decrease at small banks. To see this note that from 2009 through 2011, small business lending at large banks decreased from \$475.5 billion to \$366.4 billion, a decline of 29.8 percent. In contrast, over the same period, small business lending at community banks decreased from \$225.3 billion to \$196.9 billion, a decline of 12.6 percent.

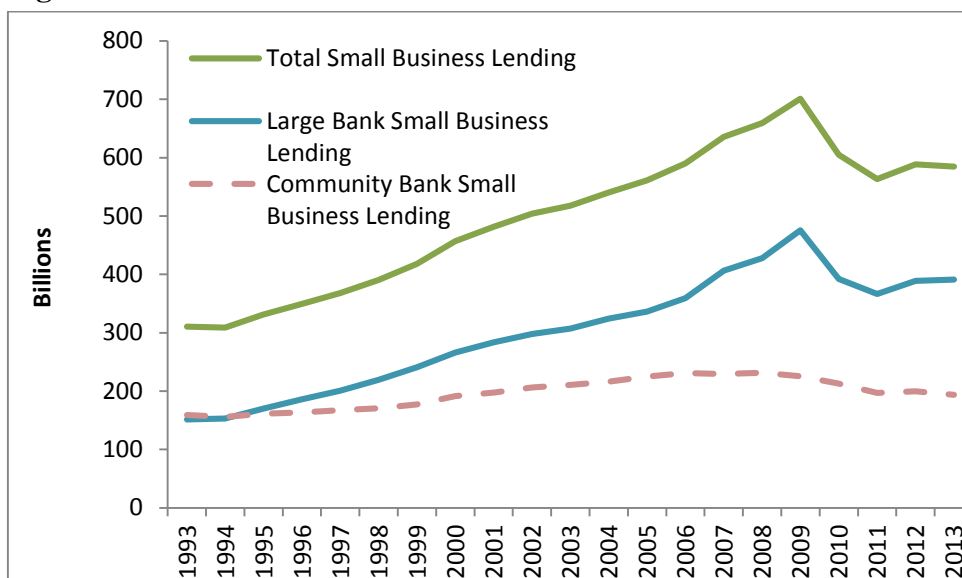
The second source of data is the U.S. Department of the Treasury website which contains information on banks participating in the Capital Purchase Program<sup>15</sup> as well as the Small Business Loan Fund.<sup>16</sup> Using this information, we identify all the banks that were part of both programs and the dates of their capital injections. This includes in several cases hand matching all the banks in multibank holding companies receiving capital injections through both TARP and the SBLF.

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<sup>14</sup> Note, however, there is no single definition of community bank. Most think of community banks as having two key characteristics—asset size, and their presence in the community. These two characteristics often go together – thus we use a simple asset measure of \$1 billion dollars (in 2010 dollars). For more on the definition of a community bank example, see Kahn et al 2003.

<sup>15</sup> For a detailed description of CPP and information on recipients see <http://www.treasury.gov/initiatives/financial-stability/TARP-Programs/bank-investment-programs/cap/Pages/default.aspx>

<sup>16</sup> For a detailed description of the SBLF and data see <http://www.treasury.gov/resource-center/sb-programs/Pages/Small-Business-Lending-Fund.aspx>

**Figure 1**

The final data source was the Cleveland Financial Stability Index (CFSI), a coincident indicator of systemic stress published by the Federal Reserve Bank of Cleveland. The index uses sixteen indicators to track stress in six types of markets: credit markets, equity markets, foreign exchange markets, funding markets, real estate markets, and securitization markets. The CFSI indicates systemic financial stress with units of the index being expressed as standardized differences from the mean (z-scores). Grades of  $-0.733$  or less indicate low levels of financial stress, while grades of  $1.82$  or more indicate periods of significant financial stress. During the financial crisis, the CFSI frequently recorded levels of stress in excess of  $1.82$  with a high of  $3.20$  in December 2008. Given that small firms are likely to experience credit problems in times of financial stress, we include this measure to control for the impact of financial turmoil on small business lending.

Table 1 provides descriptive statistics on the full sample of banks in our model, as well as differences between small and large banks. Specifically, Panel A of Table 1 provides descriptive statistics on the full sample, while Panels B and C of Table 1 breakdown the descriptive statistics by bank size. The panels show that community and



Table 1. Description Statistics 1994-2013

Variable	Panel A. Full Sample n=160241			Panel B. Community Bank n=150231			Panel C. Large Bank n=10210			Panel D. Difference in Means and Medians Community – Large			
	Mean	Median	Std Dev	Mean	Median	Std Dev	Mean	Median	Std Dev	Diff. means	t-test	Diff. med	t-test
ΔSBL	0.0740	0.0514	0.2382	0.0790	0.0556	0.2382	-0.0004	0.0069	0.2508	0.0794	32.50***	0.0487	29.30***
SIZE	11.7861	11.6329	0.9916	11.5630	11.5466	0.9916	15.0634	14.6498	1.2408	-3.5004	339.0***	-3.1032	169.30***
MULTI	0.2386	0	0.4156	0.2220	0	0.4156	0.4826	0	0.4997	-0.2606	-60.50***	0	
CAP	0.1044	0.0957	0.0389	0.1049	0.0963	0.0389	0.0964	0.0884	0.0394	0.0085	21.30***	0.0079	33.17***
CASH	0.0559	0.0412	0.0525	0.0563	0.0414	0.0525	0.0498	0.0360	0.0497	0.0065	12.18***	0.0055	22.21***
LIQ	0.3251	0.3089	0.1631	0.3280	0.3126	0.1631	0.2817	0.2626	0.1511	0.0463	27.90***	0.0501	29.71***
NPL	0.0135	0.0095	0.0151	0.0137	0.0097	0.0151	0.0112	0.0078	0.0135	0.0025	16.40***	0.0019	28.77***
DEP	0.5107	0.5320	0.1245	0.5241	0.5402	0.1245	0.3133	0.3078	0.1434	0.2108	164.0***	0.2325	123.34***
NI	0.0051	0.0054	0.0086	0.0051	0.0054	0.0086	0.0053	0.0055	0.0065	-0.0002	-2.16**	-0.0002	3.83***
STRESS	-0.0770	-0.3074	0.8410	-0.0830	-0.3074	0.8410	0.0099	-0.3057	0.8683	-0.0929			
TARP09	0.0047	0	0.0582	0.0034	0	0.0582	0.0234	0	0.1512	-0.0200			
TARP10	0.0046	0	0.0588	0.0035	0	0.0588	0.0217	0	0.1459	-0.0183			
TARP11	0.0044	0	0.0569	0.0032	0	0.0569	0.0214	0	0.1446	-0.0181			
TARP12	0.0042	0	0.0561	0.0032	0	0.0561	0.0200	0	0.1399	-0.0168			
TARP13	0.0039	0	0.0532	0.0028	0	0.0532	0.0198	0	0.1393	-0.0170			
SBLF2011	0.0016	0	0.0393	0.0015	0	0.0393	0.0028	0	0.0532	-0.0013			
SBLF2012	0.0017	0	0.0396	0.0016	0	0.0396	0.0029	0	0.0541	-0.0014			
SBLF2013	0.0017	0	0.0393	0.0015	0	0.0393	0.0039	0	0.0625	-0.0024			

\*, \*\*, \*\*\* denotes significance at the .10, .05, and .01 levels respectively.

large banks appear to be very different in their small business lending activities and in their underlying attributes. Panel D shows that differences between small and large banks are statistically significant for the bank level attributes, as well as the policy variables. For example, smaller banks hold significantly more capital and liquid assets per dollar of assets, while having a higher percentage of non-performing loans. The higher capital levels and greater liquidity are not the only difference as community banks experienced greater changes in small business lending, on average, over the full sample period. Finally, the policy variables show, as expected, that larger banks were more likely to receive TARP funds, while their smaller bank counterparts were more likely to receive funds through the SBLF program. Given these statistical differences in the attributes of large and small banks, as well as the use of different policy tools, we examine small business lending changes for the overall population of banks in our sample, as well as by bank size.

## V. Empirical Results

In this section, we employ a fixed effects panel model to explain the year-over-year percentage change in the dollar value of small-business loans (as measured by Avery and Samolyk, 2004; Cole, 2012). In the fixed-effects model, the vector  $\beta_j$  includes a set of dummy variables for each bank, which controls for the effects of each individual bank's average characteristics on lending. We aim to test several hypotheses. First, we examine the impact of the government policy variables on small business lending at banks. A priori, we expect both the TARP and SBLF variables to be positive and significant because they both, in different ways, sought to increase lending to businesses and consumers. Second, given that the stated goal of the CPP program was to stabilize the financial system by injecting capital, while the goal of the SBLF program was to spur small business lending, we also examine which of these two programs was more effective in aiding small business lending. A priori, because the SBLF program was more directly aimed at small business lending, we hypothesize that it was likely more effective in spurring small business lending than the CPP. Finally, as noted earlier, we expect financial stress to result in a decrease in small business lending. Furthermore, given the differences in the characteristics of small versus large banks, we seek to identify which was more influenced by financial stress. As noted earlier, difference in means and medians tests in Table 1 suggest that large banks and community banks behave differently with regard to small business lending and the factors that influence it.

Table 2 reports estimates for the model based on equation (1), with panels A, B, and C representing the full sample of banks, large banks, and community banks, respectively. Bank fixed effects are included in each model, but are not reported. T-statistics are based upon robust standard errors clustered at the bank level (see Petersen 2009). The parameter estimate on the asset size variable (SIZE) in Panel A is negative, suggesting that large banks experienced larger decreases in small business lending than small banks, all else equal. In addition, the negative relationship between size and the change in small business lending is also present in the large bank subset (Panel B) as well as the small bank subset (Panel C). The latter result is particularly interesting as it suggests that larger community banks reduced their small business lending more than smaller community banks. With regard to the multibank holding company variable (MULTI), the sign is negative and significant for community banks, but positive and significant for large banks. What is interesting here is that this result suggests that multibank holding company status had an impact on small business lending, but the nature of that relationship differed between large banks and community banks.

With regard to the parameters representing bank health and its impact on small business lending the results are mixed. The variable for the capital ratio (CAP) is insignificant in all cases, thereby suggesting that differences in equity capital relative to assets played no significant role in explaining differences among banks in small business lending activity. In addition, two variables to account for the liquidity of bank balance sheets, LIQ and CASH, yield mixed results. For large banks, the results suggest that banks with more liquid assets did significantly more small business lending than large banks with less liquid assets. For community banks, CASH was insignificant while banks with more liquid assets decreased small business lending by more than community banks with less liquid assets. Furthermore, as expected the coefficients on NPL are negative and significant for both large and small banks. This result is consistent with previous research on business lending in suggesting a temporal element in that past problems in lending have a negative impact on small business lending in the given period.

With regard to income (NI), the parameter estimates are positive and significant for large banks but negative for small banks. The positive estimate in the large bank equation suggests that profitability was a determining factor in the degree to which large banks increased small business lending, while the negative parameter estimate in the small bank equation suggests that small banks struggling with profitability tended to reduce small business lending. With regard to deposits, the parameter estimate on DEP is negative in the small bank case suggesting that small banks more reliant on core deposits as a source

Table 2. Panel Regression with Bank and Time Fixed Effects

	Panel A. Full Sample n=160,241 r <sup>2</sup> = .1280			Panel B. Large Bank n=10,210 r <sup>2</sup> =.0541			Panel C. Community Bank n=150,031 r <sup>2</sup> =.1370		
	Param Est	Std Error	T-stat	Param Est	Std Error	T-stat	Param Est	Std Error	T-stat
SIZE	-0.0150	0.0008	-19.95***	-0.0075	0.0033	-2.30**	-0.0098	0.0009	-10.82***
MULTI	-0.0215	0.0016	-13.63***	0.0192	0.0074	2.58**	-0.0226	0.0016	-14.02***
CAP	-0.0027	0.0290	-0.09	-0.1807	0.1295	-1.40	0.0179	0.0302	0.59
CASH	-0.0018	0.0177	-0.10	-0.2063	0.0772	-2.67***	0.0226	0.0184	1.23
LIQ	-0.0629	0.0057	-11.01***	0.0869	0.0317	2.74***	-0.0673	0.0057	-11.75***
NPL	-1.6028	0.0618	-25.96***	-0.9585	0.2116	-4.53***	-1.6134	0.0644	-25.05***
DEP	-0.0173	0.0079	-2.18**	0.2049	0.0392	5.23***	-0.0365	0.0080	-4.56***
NI	-0.3608	0.1685	-2.14**	2.4443	0.7319	3.34***	-0.4648	0.2019	-2.30**
STRESS	-0.4176	0.0174	-23.94***	-0.0119	0.0816	-0.15	-0.3510	0.0196	-17.90***
TARP09	0.0056	0.0093	0.61	0.0146	0.0192	0.76	0.0151	0.0111	1.36
TARP10	-0.0044	0.0081	-0.54	0.0550	0.0204	2.70***	-0.0050	0.0091	-0.55
TARP11	-0.0194	0.0082	-2.38**	0.0049	0.0201	0.24	-0.0309	0.0093	-3.32***
TARP12	-0.0072	0.0080	-0.89	-0.0007	0.0168	-0.04	-0.0188	0.0098	-1.92*
TARP13	-0.0007	0.0071	-0.1	0.0068	0.0146	0.46	-0.0125	0.0083	-1.51
SBLF2011	0.0785	0.0143	5.50***	0.0634	0.0266	2.39**	0.0803	0.0158	5.10***
SBLF2012	0.0870	0.0130	6.67***	0.0719	0.0379	1.90*	0.0890	0.0141	6.32***
SBLF2013	0.0751	0.0106	7.10***	0.0515	0.0205	2.52**	0.0790	0.0119	6.62***
DUM1995	-0.0806	0.0068	-11.82***	0.0081	0.0303	0.27	-0.0581	0.0074	-7.83***
DUM1996	-0.1128	0.0073	-15.41***	0.0066	0.0340	0.19	-0.0881	0.0080	-11.06***
DUM1997	0.0674	0.0039	17.48***	0.0206	0.0187	1.10	0.0652	0.0040	16.42***
DUM1998	0.0976	0.0043	22.63***	0.0275	0.0217	1.27	0.0898	0.0046	19.74***
DUM1999	0.1896	0.0071	26.89***	0.0549	0.0321	1.71*	0.1661	0.0078	21.19***
DUM2000	0.5846	0.0214	27.27***	0.0905	0.0987	0.92	0.5030	0.0242	20.79***
DUM2001	0.3633	0.0141	25.80***	0.0617	0.0638	0.97	0.3088	0.0159	19.45***
DUM2002	0.1904	0.0079	24.23***	0.0030	0.0351	0.09	0.1641	0.0088	18.61***
DUM2003	0.7728	0.0316	24.44***	0.0661	0.1455	0.45	0.6487	0.0357	18.16***
DUM2004	0.1860	0.0077	24.11***	0.0480	0.0323	1.49	0.1562	0.0088	17.84***
DUM2005	0.5888	0.0237	24.89***	0.0599	0.1074	0.56	0.4958	0.0268	18.50***
DUM2006	-0.0243	0.0042	-5.80***	0.0646	0.0205	3.15***	-0.0238	0.0043	-5.56***
DUM2007	-0.0699	0.0048	-14.49***	0.0479	0.0238	-0.69	-0.0657	0.0050	-13.1***
DUM2008	1.0352	0.0433	23.89***	0.0902	0.1999	0.45	0.8627	0.0489	17.64***
DUM2009	0.9687	0.0415	23.35***	0.0326	0.1904	0.17	0.8049	0.0469	17.17***
DUM2010	0.0839	0.0065	12.81***	-0.0295	0.0290	-1.02	0.0582	0.0074	7.87***
DUM2011	0.2665	0.0142	18.73***	0.0147	0.0638	0.23	0.2048	0.0162	12.61***
DUM2012	0.7264	0.0330	22.00***	0.0437	0.1500	0.29	0.5955	0.0373	15.97***
DUM2013	0.2092	0.0116	18.09***	0.0361	0.0495	0.73	0.1611	0.0131	12.28***

T-statistics are based upon robust standard errors clustered at the bank level.

\*, \*\*, \*\*\* denotes significance at the .10, .05, and .01 levels respectively

of funding tended to reduce small business lending more than their less deposit counterparts. For large banks, and consistent with theory, the parameter estimate for DEP is positive and significant. Finally, the results for the time dummies are generally insignificant for large banks, and generally positive and significant for small banks

throughout the 1997 to 2013 period. This suggests that exogenous factors in those years led to an increase in small business lending among community banks relative to 1994.

One of the unique contributions of the paper is to assess the impact of financial instability on small business lending. The empirical results in Table 2 confirm our hypothesis that financial stress had a negative impact on small business lending at community banks. Using a parameter estimate of -0.3510 on STRESS and an average financial stress level of 1.386 for the year 2009 suggests a decrease in small business lending by community banks equal to 48.7 percent due to the stress in markets during the financial crisis. Given an aggregate total small business lending by community banks in 2009 of \$225.3 billion, this equates to a decrease of \$109.6 billion due to financial instability. Given the magnitude of the impact of financial stress on community banks, it is clear that other factors, including those exogenous factors captured by the 2009 time dummy, helped mitigate the devastating impact of financial stress. Finally, it is noteworthy that the parameter estimate on STRESS is not significant in the large bank equation. Taken as a whole, our results suggest that not only did the financial crisis have a greater impact on small business lending at community banks than at large banks, but also that large banks may have behaved in a manner consistent with too big to fail.

One of the primary purposes of this paper is to assess how effective TARP and SBLF were in increasing small business lending during the financial crisis. To this end, Panel A in Table 2 shows that for the full sample, TARP funds had little impact on small business lending. The exception here is 2011 where banks that received TARP funds decreased their small business lending. In addition to the overall impact of TARP on small business lending, Panels B and C in Table 2 examine how TARP influenced small business lending for large and small banks, respectively. For large banks, Panel B shows the parameters are insignificant with the exception of 2010; in this case TARP is positive and significant. The 2010 parameter estimate equals 5.5 percent. Thus, with the exception of 2010, large banks receiving TARP funds and non-TARP large banks exhibited no significant difference in their small business lending patterns. Despite the 2010 exception, TARP appears to have been ineffective in stimulating small business lending by large banks. For small banks, the parameter estimates on TARP are negative and significant in 2011 and 2012 and equal -3.09 and -1.88 percent, respectively. In the other three cases, the parameter estimates on TARP are insignificant, although the 2013 estimated parameter is negative and marginally insignificant (significant at the 13.2 percent level). While the primary purpose of TARP was to stabilize financial institutions and the U.S. financial system, the results generally show that receiving TARP funds had

either no effect or a negative effect on small bank lending by both large and small banks. Furthermore, it is interesting to note that the ineffectiveness of TARP funding in terms of stimulating small bank lending was particularly pronounced at small rather than large banks.

In contrast, the results in Panel A for the overall set of banks suggests that small business lending growth at banks receiving funds through the SBLF was significantly greater than non-SBLF banks. Upon closer examination in Panels B and C, the effect of the SBLF program on small business lending growth was found to differ between large and small banks. For large banks, the parameter estimates on SBLF in Panel B are positive and significantly different than zero for all three years. Here, the parameter estimates range between 0.0515 and 0.0719. In a similar manner, the parameter estimates on SBLF are positive and significant in all cases for small banks. But here, the parameter estimates range from a low of 0.079 in 2013 to a high of 0.089 in 2012. Thus, for all three years, the parameter estimate on SBLF is at least 23.7 percent greater in the small bank equation than in the corresponding large bank equation. Taken as a whole, and contrary to our overall results for TARP, the results for the SBLF program point to a positive and significant impact of the program on small business lending by both large and small banks. This may result from the fact that the SBLF program directly reduced bank's cost of capital based on the magnitude of the increase in small business lending. To quantify the impact of the SBLF, note that the average small bank in our sample had small business lending equal to \$32.25 million in 2012. Given the parameter estimate of 0.0318, this implies an increase in small business lending of \$2.87 million for community banks receiving SBLF funds versus those that did not. For large banks, the average small business lending in 2012 was \$691.8 million. Given the parameter estimate of 0.0719, this implies an increase in small business lending at large banks of \$49.7 million in 2012.

## VI. Conclusion

In this study, we analyze the determinants of small business lending growth, how small business lending behaved during the financial crisis, and how those changes were affected by bank size. Furthermore, we examine the impact of financial turmoil on banks, as well as the impact of policy intervention on small business lending in the aftermath of the financial crisis. We find several important results. First, we find that bank lending to small businesses in the U.S. declined significantly following the crisis, and that it declined by significantly more at larger banks. These results hold in both univariate and

multivariate analyses. Second, we find capital injections from the TARP's \$200 billion Capital Purchase Program generally had either no effect or a small but negative effect on small business lending. The only exception here is large banks receiving TARP funds in 2010 did show a significant increase in small business lending. A primary goal of TARP was to improve the financial stability of the U.S. economy as well as U.S. financial institutions. In that sense, it is perhaps not surprising that TARP had little or a slightly negative impact on small business lending. In contrast, the SBLF lending program appears to have been a success as both large and small banks participating in the loan fund significantly increased their lending to small firms. Third, we find that financial turmoil had an extremely damaging impact on small business lending by community banks. With regard to large banks, financial stress was not shown to have a significant effect on small business lending.

This paper is one of the first, to our knowledge, that examines how the financial crisis impacted bank lending to small U.S. businesses. Furthermore, this study provides both academics and policy makers with new insights into how the financial crisis affected the availability of credit to small firms, and the impact of two distinct government policies, TARP and the SBLF, on small firms' ability to access credit. It also highlights the difficulties the financial crisis caused small businesses in accessing credit during this period. Our findings strongly suggest that TARP's Capital Purchase Program failed to increase small business lending at participating banks beyond what we observed at non-participating banks, while the SBLF had the opposite impact. This has important policy implications for policy makers that face ongoing questions about the TBTF issue and whether banks should have a size cap or be broken up. From the perspective of small business lending, smaller appears to be better.

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