Bank Lending to Rural vs. Urban Firms in the United States Before, During, and After the Great Financial Crisis

by

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Executive Summary

The ability of small businesses to access financing continues to be one of the most pressing policy issues in the U.S. Given the well-documented role of small businesses in creating jobs and economic growth, policymakers and regulators must act to ensure that creditworthy firms and their owners are able to obtain sufficient financing for the businesses to survive economic downturns and grow during other periods. Without adequate financing, small businesses will not be able continue their critical contributions to economic growth and employment.

The data on small-business lending collected by bank regulators to comply with the Community Reinvestment Act (CRA) of 1977 provides analysts, policymakers, regulators and the public with information on how much lending each bank is doing in each neighborhood. The first round of CRA data were released in 1997 and provides information on bank lending during calendar year 1996, and subsequent rounds have been released each year through 2016. With information on both the amount and number of loans made by banks in each Census tract, these data provide incredibly detailed information on the status of bank lending to small businesses in more than 30,000 neighborhoods. Only banks with assets above a threshold are subject to the CRA reporting requirements. Although almost 90 percent of banks are exempt, those banks account for only about 25 percent of total assets.

This report provides an analysis of how lending changed overall and in rural vs. urban areas before, during, and after the financial crisis of 2008-2010. The analysis shows that rural firms have poorer access to bank credit than their urban counterparts in terms of both the amount and number of loans, and that this situation has deteriorated, rather than improved during the post-crisis years of 2011-2016.

All originations peaked in 2007 at $319.2 billion, of which $282.8 billion was in urban areas and $36.6 billion in rural areas. Post-2000 originations hit bottom in 2010 at $170.5 billion—a decline of 47% from the 2007 peak. However, originations in the smaller size bucket (< $100,000) declined by 63% while originations in the larger bucket declined by only 33%.

In both urban and rural areas, the percentage declines from 2007 to 2010 are 47 % and 43.5 respectively—not much different from the nation as a whole. By 2016, the total amounts of originations had rebounded somewhat, but for the nation as a whole remained 29% below the 2007 peak at only $226.3 billion. Originations in the smaller size bucket remained 43% below the 2007 peak, whereas originations in the larger size bucket were only 19% below the 2007 peak.

The recovery in urban areas is almost identical to those in the nation as a whole, but a different story holds in rural areas, where overall originations remain 41% below the 2007 amount. In fact, total originations in rural areas peaked in 2003 and bottomed in 2014, four years later than the bottom in urban areas. By 2016, originations in the smaller size bucket were 52% below the 2007 amount, while originations in the larger size bucket were 32% below the 2007 amount.

To briefly summarize the key finding of this report:

- Small-business loan originations have been lower in rural Census tracts than in urban Census tracts.
- During the crisis years of 2008-2010, originations declined by about the same percentage in rural and urban Census tracts.
- During the post-crisis years 2011-2016, originations in rural Census tracts recovered by less than did originations in urban Census tracts.

- These results hold for both the amount and number of small-business loan originations.

The results of this study suggest that inadequate access to financing is an issue that disproportionately affects rural small businesses. Moreover, the results show that this issue became even more pronounced during, and, especially, after the financial crisis of 2008-2010. Future research that may be helpful in formulating policy responses could explore the roles of differences in the determinants of the supply and demand for loans, including issues like differences in the availability of business opportunities and differences in the availability of suitable collateral.

1. Background

During the financial crisis, credit markets in the U.S. virtually froze up. Lax underwriting standards led to unprecedented levels of nonperforming loans that led bank regulators to close almost 500 banks during 2009-2012. Cole (2012) documents how these developments affected bank lending to small businesses, plummeting from 2008 highs by almost 20% during 2009-2010. Moreover, he also provides evidence that the decline in lending was much greater at large than at small banks, even though failures were heavily concentrated among small rather than large banks. Cole (2018) extends this analysis through the recovery years of 2011-2015 and finds little evidence of a recovery in small-business lending.

The current study extends the works of Cole (2012, 2018) by analyzing FFIEC data at the census-tract level on bank originations of small-business loans to test whether the decline in lending documented in those (and other) studies disproportionately impacted small businesses located in rural areas during the crisis years 2008–2010; and, if so, whether there has been any sort of recovery during the post-crisis years 2011–2016. The current study also tests whether banks made fewer loans to small businesses in rural areas before, as well as during and after the financial crisis. The analysis reveals that banks made fewer loans to rural small businesses before, during, and after the financial crisis; that rural small businesses were, indeed, disproportionately hurt during the crisis years relative to urban small businesses, which also were hurt, but not as severely; and that rural small businesses saw less of a recovery during the post-crisis years than did their urban counterparts. These findings support efforts by policymakers and bank regulators to find new policies and regulations that can boost bank small-business lending in rural areas.

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, for example, Petersen and Rajan, 1994; Berger and Udell, 1995; Cole, 1998; Cole, Goldberg and White, 2004; Berger and Udell, 1995, 1996, 1998a; Cole, 2008, 2009, 2010, 2012, 2018; Cole and Sokolyk, 2016; Jagtiani and Lemiux, 2016).

Both theory dating back to Shumpeter (1934)[1] 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 workers and make fewer productive investments than firms utilizing debt in their capital structure. A better understanding of how the bank lending to rural small businesses fared during the crisis years of 2009 – 2010 and the post-crisis recovery years of 2011- 2016 should provide policymakers with guidance on how to tailor economic and tax policies to boost bank lending to small rural firms. These policies will help to increase both employment and GDP, especially in rural neighborhoods, and reducing disparities in wealth between rural and urban business owners.

Why is this analysis of importance? According to the U.S. Department of Treasury and Internal Revenue Service, there were more than 33 million businesses that filed taxes for 2013, of which 24 million were nonfarm sole proprietorships, 4.3 million were S-corps, 3.5 million were partnerships and 1.6 million were C-corporations; all but about 10,000 C-corporations were privately held and the vast majority have annual revenues less than $1 million.[2] Small firms are

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

[2] 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 2013 is used for reference because it was the latest year for which statistics were available at the time this article was written.

vital to the U.S. economy. According to the U.S. Small Business Administration, 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 U.S. between 1992 and 2013.[3] Therefore, a better understanding of how bank credit to small businesses was affected by the financial crisis can help policymakers take actions that will lead to more credit, which will translate into more jobs and faster economic growth.

The current study contributes to the literature on the availability of credit to small businesses by providing the first rigorous analysis of how bank loan originations to rural small businesses fared during the crisis and post-crisis years of 2009-2010. New evidence presented in this study, finding that how rural small businesses were disproportionately impacted relative to their urban counterparts, suggests that policymakers and regulators need to craft new economic and tax policies as well as new regulations to encourage banks to boost their lending to small firms located in rural areas.

2. Literature Review

2.1. Availability of Credit to Small Businesses

The issue of the availability of credit to small businesses has been studied by financial economists for at least sixty years, dating back at least to Wendt (1946), who examines availability of loans to small businesses in California. Since then, scores of articles have addressed this issue.

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[3] 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 research.

This review of the literature is limited 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 the FFIEC CRA data on small business loan originations by banks.[4] The study most closely related to this one from a methodological viewpoint is Peek and Rosengren (1998), who examine the impact of bank mergers on small business lending.[5] 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 or not the bank was involved in a merger, whereas, in our study, the treatment is whether or not the borrower is located in a rural census tract. Peek and Rosengren find that small-business lending of the consolidated bank (post-merger) converges towards the small-business lending of the pre-merger acquirer rather than that of the pre-merger target.

Ou and Williams (2009) use data from a variety of sources, including the FFIEC Call Reports, to provide an overview of small business lending by U.S. financial institutions during the past decade. Using the FFIEC data, they present aggregate statistics from 1995 – 2007 on small business lending by depository institutions, including a breakdown by institution size and a discussion on the growing importance of business credit-card loans.

Li (2013) also looks at how the financial crisis affected bank lending, but her focus is on lending by banks that participated in the Capital Purchase Program ("CPP"). She finds that CPP

[4] There also is a related body of work on the availability of credit that relies upon information on the Surveys of Small Business Finances (SSBFs). See, for example, Petersen and Rajan (1994), Berger and Udell (1995), Cole (1998, 2008, 2009, 2010), and Cole, Goldberg and White (2004), Craig and Hardee (2007); Hardee (2007); and Rice and Strahan (2010).

[5] There also are a number of other studies that examine how mergers affect small-business lending, including Berger *et al*. (1998) and Cole and Walraven (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.

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 Great Financial Crisis (GFC).

Cole (2012) uses FFIEC data on the stock of small business loans to examine how small business lending by banks changed during the GFC years. He finds that, from June 2008 to June 2011, small-business lending declined by $116 billion, or almost 18%, from $659 billion to only $543 billion; and that small commercial & industrial lending declined by even more, falling by more than 20% over the same period. Cole also examines lending by banks that did and did not participate in the CPP. Contrary to Li (2013), who examined all business lending, he finds that banks participating in the CPP cut small business lending by even more than non-participants. Finally, Cole documents a strong negative relation between bank size and business lending, and a strong positive relation between bank capital adequacy and business lending.

Mills and McCarthy (2015) provide an assessment of access to credit by small businesses during the post-crisis 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, that impede bank lending to small businesses. They posit that emerging online lenders may help to mitigate these structural barriers by providing an alternative supply of small business credit.

Jagtiani and Lemieux (2016) use 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--a trend that accelerated following onset of the GFC in 2008. They also find that, during the run-up to the

GFC when housing prices were rising rapidly, small businesses increased the use of home equity lines of credit to fund their operations.

Three recent papers (Bord *et al*. 2017; Flannery and Lin, 2016; and Jang, 2017) have used county-level FFIEC data on small business loan originations to analyze the impact of housing prices on small-business lending during the recent financial crisis.

Bord *et al*. (2017) use CRA loan-origination data from 2005-2013 to analyze the role of large banks in propagating financial shocks across the U.S. economy. They find that banks operating in the counties most severely affected by the decline in housing prices reduced small-business loan originations even in counties where housing prices were not severely affected by the crisis. In many cases, these banks ceased to lend in unaffected counties. In contrast, banks not exposed to loans in severely affected counties expanded their operations. Finally, they report that their findings persist for years after the initial shock.

Flannery and Lin (2016) use CRA loan-origination data from the pre-crisis period 1996-2006 analyze how increases in house prices affected small-business lending. They find that the real estate bubble caused growth not only in real-estate loans, but also in small-business commercial & industrial loans, even after controlling for local economic conditions.

Jang (2017) uses CRA loan-origination data from 2005-2010 to analyze the effect of the TARP on the propagation of real estate shocks via geographically diversified U.S. banks. Employing a difference-in-differences identification strategy, she finds that the amount of TARP money provided to banks in distressed areas is positively associated with small-business loan originations in non-distressed areas. She also finds that TARP funds helped recipient banks return faster to their pre-crisis franchise values.

Rupasingha and Wang (2017) study how access to capital affects the growth rate of U.S. small businesses. They find that small business growth is positively related to small-business lending, using county-level CRA data on small-business lending and county-level data on the number of establishments.

Conroy *et al*. (2017) examine how changes in small-business lending affects the subsequent births of establishments. Using annual county-level CRA data on small-business originations and county-level Census data on establishment births from the Census' Business Information Tracking Series they find that the establishment birth rate is higher in counties where the levels and change in the level of small-business lending are greater. Moreover, they find that these effects are stronger in rural than in urban counties.

Cole (2018) uses bank-level FFIEC Call Report data on the stock of small-business loans outstanding as well as bank-level FFIEC CRA loan-origination data on the flow of small-business loans (i.e., originations) to examine how small-business lending by banks changed during the GFC crisis years of 2009-2010 as well as during the post-crisis years of 2011-2015. He finds that bank lending to small businesses remained depressed throughout the post-crisis years, while total-business lending saw somewhat of a recovery. His analysis also documents that the declines in small-business lending were significantly greater at large banks than at small banks, and at banks in worse financial condition than at banks in better financial condition.

2.2. Availability of Credit to Rural Small Businesses

An exhaustive search of the academic literature reveals that there are only a handful of studies that analyze small-business lending to rural U.S. firms. While there are a number of studies that look at the availability of credit to rural firms in developing countries, these are of little relevance to the current study. The closest study to the current one is Laderman and Reid

(2010), who use CRA data on small-business lending to look at lending in low and middle-income (LMI) areas during the financial crisis. For the entire U.S., they report dramatic declines in both the number and amount of small-business loan originations from 2007 to 2009. Their multivariate analysis provides some evidence that lending declined even more in LMI areas than in middle-income and upper-income areas. However, they do not look directly at lending in rural versus urban markets.

DeYoung *et al*. (2012) analyze data on about 18,000 U.S. Small Business Administration loans made by urban and rural community banks during 1984 – 2001 to investigate how "ruralness" affects loan default rates. They hypothesize that rural bankers have better information about their borrowers from closer ties within the rural communities, which should lead to better underwriting decisions. They find support for this hypothesis in that loans issued by rural banks and loans issued to rural borrowers default less frequently than comparable urban loans. They also find that default rates are higher when a banker lends to a borrower who is located outside of the banker's geographic market. Their findings provide a possible explanation for why rural community banks continue to play an important role in lending to small businesses.

Hall and Yeager (2002) analyze financial data from a sample of small rural banks located in the Midwest to test whether local economic activity affects performance. They examine bank performance as measured by profitability and asset quality—two of the components of the CAMELS rating system. They examine local economic activity as measured by unemployment, employment growth, personal income growth, and per capita income growth at both the county and state level for the county and state in which their sample banks are located. Surprisingly, they find that economic activity measured at the state-level, but not county-level, affect the financial performance of these banks.

3. Data

To conduct this study, the author used data from a number of sources. The primary source is the FFIEC's Community Reinvestment Act (CRA) database.[6] The CRA was passed into law in 1977 by Congress (12 U.S.C. 2901) and has been implemented by bank regulators (see 12 CFR parts 25, 228, 345, and 195). Congress intended that CRA would encourage each financial institution to take steps to meet the credit needs of borrowers in the localities in which the institution does business.

In part, the CRA regulations require that financial institutions report annually information on their lending to small businesses. In particular, they are required to report the numbers and amounts of business loans originated in amounts less than $100,000, $100,000 - $250,000, and $250,000 - $1 million. In addition, they must report the number and amount of loans originated to firms with less than $1 million in revenues. Because these are originations rather than outstanding portfolio amounts, they represent the flow of new loans to small businesses, whereas the Call Report data analyzed by Cole (2012, 2018) and others represent the stock of loans to small business. The FFIEC makes available aggregate loan originations at the granularity of the state, MSA, county, and Census tract as well as for the country as a whole. Identification by Census tract enables researchers to merge the loan-origination data with demographic data from the U.S. Census to identify the urban vs. rural location (and other characteristics) of each census tract, which are used as proxies for ownership of the firm.

[6] The CRA data on small-business loan originations are available for public download from the FFIEC's website at: http://www.ffiec.gov/cra/default.htm.

The CRA provides relief for small banks that are assumed to make business loans only to small firms; while the threshold for this reporting has changed each year, in general since 2005, banks with assets less than $1 billion have been exempt from the CRA reporting requirement. This exemption covers almost 90% of banks by number, but only about 25% by assets.[7] Nevertheless, it is an important shortcoming of this source of data; the data are not complete and do not cover small community banks. The CRA data on small-business loan originations used in this study span the years 1996 - 2016.

In order to identify lending to rural vs. urban firms, the author obtained Census demographic (and other) data at the Census-tract level from the FFIEC's website,[8] which were merged with the Census-tract CRA loan origination data. A Census tract is classified as "rural" when the Census MSA/MD code is set to a value of 9999, which indicates that the tract falls outside of a Metropolitan Statistical Area/Metropolitan Division.[9] The FFIEC Census data also provide information at the Census-tract level on a number of variables that can be used to construct control variables for the analysis. These include population, median family income,

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[7] These statistics are based upon the author's calculations using CRA and Call Report data. Similar statistics have been reported by other researchers.

[8] These data are available for download at: https://www.ffiec.gov/censusapp.htm. Although there are annual datasets for 1996 through 2016, the 1990 Census data are used for 1996 – 2002, the 2000 Census data are used for 2003-2012, and the 2010 Census data are used for 2013-2016. Hence, there are only three different time-series values over the 21-year period. As described below, the author linearly interpolates data for each non-Census year, using 2016 data from the American Community Survey as the endpoint for 2011-2016.

[9] This definition of "rural" includes "Micropolitan Area," which the OMB defines as a county or county equivalent containing an urban area with a population of at least 10,000 but less than 50,000. A county or county equivalent containing an urban area with a population of 50,000 or more is defined as "Metropolitan Area." Together, Micropolitan and Metropolitan Areas are known as "Core-Based Statistical Areas" or CBSAs. An alternative definition of rural not used in this study would be areas outside of CBSAs. Yet another definition would be to make use the population in each Census tract that are classified as urban and rural; and classify based upon which is larger. For more information, go to: https://www.census.gov/programs-surveys/metro-micro/about.html

median age, and employment status, among others. The use of data at the Census-tract level rather than the county or state levels allows more precise matching of lending data to control variables. The FFIEC Census data are augmented with data from the 2016 five-year estimates from the Census' American Community Survey (ACS).[10] The author then used the 1990, 2000, and 2010 Census data and 2016 ACS data to linearly interpolate annual observations for each control variable.

4. Methodology

4.1 Univariate Tests

In order to provide new evidence on how the financial crisis affected bank lending to rural small businesses, this study employs both univariate and multivariate tests. First, univariate tests are used to analyze small-business loan originations in aggregate and by rural vs. urban census tract. Eight different measures are analyzed; four that measure the dollar amount of small-business loan originations and four that measure the number of small-business loan originations. For both number and amount, the four measures are:

- small-business loans originated in amounts less than $100,000;
- small-business loans originated in amounts of $100,000 $250,000;
- small-business loans originated in amounts of $250,000 $1 million; and
- Small-business loans originated to firms with revenues less than $1 million.

4.2 Multivariate Tests

This study also conducts multivariate tests on the data. Statistical techniques that exploit

[10] The data and accompanying documentation are available from the Census webpage: https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2016/

the panel nature of the dataset are used to explain eight different measures of small-business lending--four that measure the dollar amount of small-business loan originations and four that measure the number of small-business loan originations. More specifically, a variation of the "difference-in-difference" methodology," which dates back to the seminal study by Ashenfelter and Card (1985), is used to analyze differences in lending by banks in urban and rural areas. Imbens and Wooldridge (2007, p. 1) explain the methodology as follows:

> "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."

In the current study, two groups—small businesses located in urban vs. rural census tracts—are exposed to an exogenous shock—the financial crisis. One can then observe whether the two groups experience differential outcomes in response to the exogenous shock. This is analogous to a medical experiment that tests whether a particular drug, such as aspirin, has a differential effect on men and women, allowing for causal inference. (See, e.g., Roncaglioni *et al*., 2001.)

Our general model takes the form:

$$SBL_{i,t} = \beta_0 + \beta_1 \times Fin'l\ Crisis + \beta_2 \times Rural_{i,t1} + \beta_3 \times Fin'l\ Crisis \times Rural_{i,t1}$$
$$+ \beta_4 \times Post\text{-}Crisis + \beta_5 \times Post\text{-}Crisis \times Rural_{i,t1}$$
$$+ \sum \beta_k \times Controls_{i,t1}$$
$$+ \epsilon_{i,t} \qquad (1)$$

where:

$SBL_{i,t}$ is one of our two measures of small-business lending:

(1) ln(ASBL) is the natural logarithm of the dollar amount of small-business loan originations in census tract i during year t;

(2) $ln(NSBL)$ is the natural logarithm of the number of small-business loan originations in census tract i during year t;

Fin'l Crisis is an indicator for the crisis years of 2008-2010;

Post-Crisis is an indicator for the post-crisis years of 2011-2016;

$Rural_{i,t}$ is an indicator for rural classification of Census track i during year t;

$Controls_{i,t1}$ is a vector of control variables, including the value of the dependent variable rate during year *t-1* and Census tract variables for the natural logarithm of population, median family income as a percentage of MSA median family income, the employment-to-population ratio, and the labor force participation rate during year *t-1*; and

$\epsilon_{i,t}$ is an i.i.d. error term.

We also estimate a simpler model to test whether lending to rural firms was different from lending to urban firms. Our simpler model takes the form:

$$SBL_{i,t} = \beta_0 + \beta_2 \times Rural_{i,t1} + \sum \beta_k \times Controls_{i,t1} + \epsilon_{i,t} \qquad (2)$$

In each model, we include a set of year fixed effects and a set of state fixed effects, or a set of state x year fixed effects. The former enables us to provide evidence on how small-

business lending declined in each year following onset of the financial crisis. The latter enables us to better control for differences in loan demand across time by state. Although a difference-in-difference style of model is used, we do not attempt to identify causal relationships with this analysis.

5. Hypotheses

The primary hypotheses to be tested in this study revolve around the crisis and post-crisis indicator variables, the treatment variables that indicate rural Census tracts, and the interaction of the treatment variables with the crisis and post-crisis indicator variables.

H1: Small-business-loan originations throughout the sample period are lower in rural census tracts than in urban census tracts.

The expectation is that small-business loan originations in rural census tracts are lower than in urban census tracts because of the challenges faced by businesses in rural areas. This implies that the expected β_2 coefficient for $Rural_{i,t1}$ in equation (2) is negative and statistically significant.

H2A: During the financial-crisis years 2008-2010, small-business-loan originations in rural census tracts declined by a greater percentage than did originations in urban census tracts during those years.

Following onset of the financial crisis in 2008, the expectation is that small-business-loan originations in rural census tracts declined by a greater percentage than did originations in urban census tracts as banks sought to boost their capital ratios by reducing small-business loans in general and by reducing loans to borrowers more distant from their headquarters, which are in

urban areas. Bankers would be more loyal to their more credit-worthy customers. This implies that the coefficient β_3 on $Fin'l\ Crisis \times Rural_{i,t-1}$ in eq. (1) is negative and statistically significant.

H2B (alternative to H2A): During the financial crisis years 2008-2010, small-business-loan originations in rural census tracts declined by less than did originations in urban census tracts during those years.

As an alternative to H2A, the expectation is that, following onset of the financial crisis in 2008, small-business-loan originations in rural census tracts declined by less than did originations in urban census tracts as bankers sought to raise their capital ratios by reducing originations to less creditworthy borrowers. DeYoung et al. (2012) provide evidence that rural small businesses are less likely to default than are their urban counterparts. This implies that the expected coefficient β_3 on $Crisis \times Rural_{i,t-1}$ in eq. (1) is positive and significantly different from zero.

H3A: During the post-crisis years 2011-2016, small-business loan originations in rural census tracts recovered by a greater percentage than did originations in urban census tracts during those years.

The expectation is that small-business loan originations, in general, recovered post crisis ($\beta_4 > 0$), but we also expect that originations in rural census tracts recovered by <u>more</u> than originations in urban census tracts, as bankers sought to expand credit to their more creditworthy customers. This implies that the coefficient β_5 on $Post\text{-}Crisis \times Rural_{i,t-1}$ is positive and statistically significant.

H3B (alternative to H3A): During the post-crisis years 2011-2016, small-business loan originations in rural census tracts recovered by less than did originations in urban census tracts during those years.

As an alternative to H3A, the expectation is that small-business-loan originations recovered post crisis ($\beta_4 > 0$), but that originations in rural census tracts recovered by less than originations in urban census tracts, as bankers returned to funding their less creditworthy borrowers.

This implies that the coefficient β_5 on $Post\text{-}Crisis \times Rural_{i,t-1}$ is negative and statistically significant.

6. Results

6.1. Univariate Results

6.1.1. Amounts of Originations by Loan Size

Figures 1 – 2 show the aggregate amounts of small-business-loan originations by year for two size buckets of loans: less than $100,000, and $100,000 to $1 million. This information also appears in tabular form in Table 1. Aggregate originations peaked in 2007 at $319 billion, of which $282 billion was in urban areas and $37 billion in rural areas. Post-2000, aggregate originations hit bottom in 2010 at $170 billion—a decline of 47% from the 2007 peak. However, originations in the smaller size bucket (< $100,000) declined by 63% while originations in the larger bucket declined by only 33%.

Figure 1:
SBL Originations, 1996-2016
Originated in Amounts < $100,000
Aggregate Dollar Amounts in Urban vs. Rural Areas

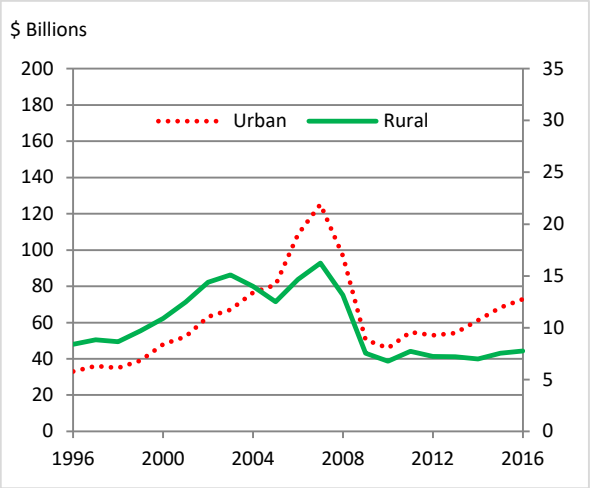


Figure 2: SBL Originations, 1996-2016

Originated in Amounts $100,000 $1 Million
Aggregate Dollar Amounts in Urban vs. Rural Areas

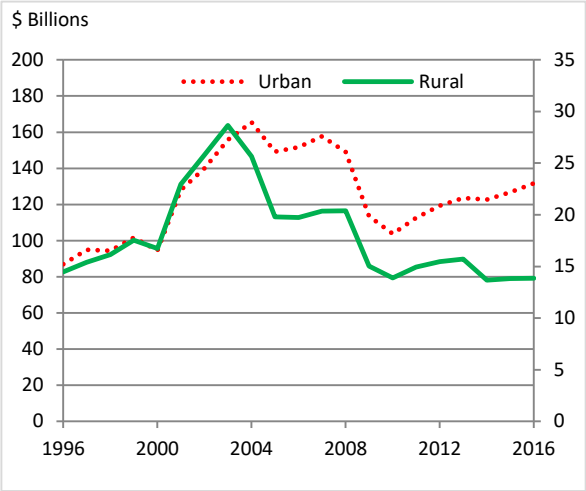


Figure 3:
SBL Originations per Capita, 1996-2016
Originated in Amounts < $100,000
Average Dollar Amounts per Capita in Urban vs. Rural Areas

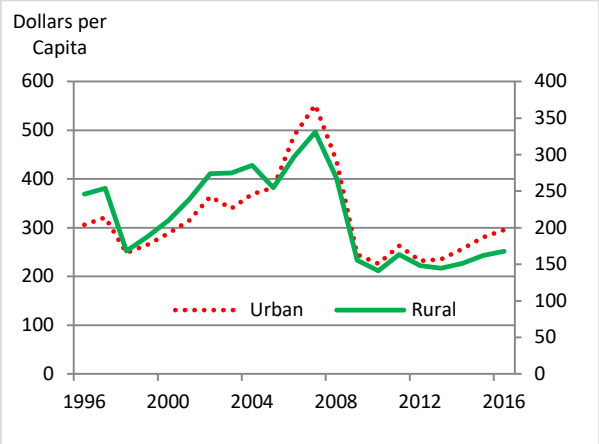
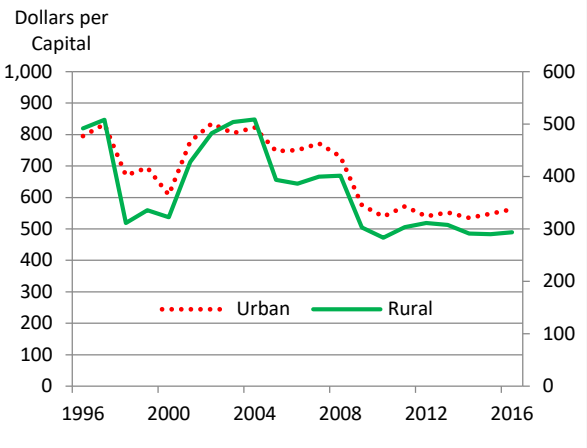


Figure 4:
SBL Originations per Capita, 1996-2016
Originated in Amounts $100,000 $1 Million
Average Dollar Amounts per Capita in Urban vs. Rural Areas



In both urban and rural areas, the percentage declines from 2007 to 2010 are almost identical to the nation as a whole. By 2016, the aggregate originations had rebounded somewhat, but for the nation as a whole remained 29% below the 2007 peak at only $226 billion. Originations in the smaller size bucket remained 43% below the 2007 peak, whereas originations in the larger size bucket were only 18% below the 2007 peak.

The recovery in urban areas is almost identical to those in the nation as a whole, but a different story holds in rural areas, where overall originations remain 41% below the 2007 peak. In fact, total originations in rural areas bottomed in 2014, four years later than the bottom in urban areas. Rural originations in the smaller size bucket were 52% below the 2007 peak, while rural originations in the larger size bucket were 32% below the 2007 peak. In summary, originations in both urban and rural areas dropped by more than 40% during the crisis years; from 2010 to 2016, originations have rebounded noticeably in urban areas, but there has been almost no such recovery in rural areas. Overall, the univariate statistics indicate that originations in both urban and rural areas suffered about equally during the crisis years of 2008 – 2010, but that there has been much less of a recovery in rural areas. These results support only hypothesis H3B: during the post-crisis years of 2011 – 2016, originations in rural areas recovered by less than did originations in urban areas.

The geographic boundaries of MSAs are often altered a few years after a decennial census.[11] Changes in classification from rural to urban following the 2010 Census may account for some or all of the observed decrease the total lending amounts for rural areas, creating patterns like those shown in Figures 1 and 2 above.

To address this issue, loan amounts in each Census tract can be scaled by the population in each Census tract. The average of loan amounts per capita should provide a more meaningful comparison of trends and a more direct univariate comparison of rural to urban lending levels.[12] Figures 3 – 4 show the average amounts of small-business-loan originations per capita by year for two size buckets of loans: less than $100,000, and $100,000 to $1 million. This information

[11] For details, see information at the website of the U.S. Census: https://www.census.gov/programs-surveys/acs/geography-acs/concepts-definitions.html.
[12] The author is grateful to peer reviewers and SBA staff for suggesting this line of analysis.

also appears in tabular form in Table 2. Both Figures 3 and 4 show a less pronounced rebound in lending to firms in urban areas relative to firms in rural areas than do Figures 1 and 2, indicating that changes in MSA boundaries may account for some of the differences shown in Figures 1 and 2.

Average originations per capita peaked nationally in 2007 at $1,195; for urban areas in 2007 at $1,303; and for rural areas in 2004 at only $793. Post-2000, average originations per capita nationally hit bottom in 2010 at $689—a decline of 42% from the 2007 peak. However, originations in the smaller size bucket (< $100,000) declined by 59% from their 2007 to the 2010 trough while originations in the larger bucket declined by only 30% from peak to trough.

By 2016, average originations per capita nationally had recovered somewhat, but remained 35% below their peak; originations in urban areas also had recovered to 35% below their 2007 peak, but originations in rural areas remained near crisis lows, down 42% from their 2004 peak.

In summary, originations per capita in both urban and rural areas dropped by more than 40% during the crisis years; from 2010 to 2016, originations per capita in urban areas recovered somewhat, but there has been almost no such recovery in rural areas. Overall, the univariate statistics indicate that originations in both urban and rural areas suffered about equally during the crisis years of 2008 – 2010, but that there has been less of a recovery in rural areas. These results support only hypothesis H3B: during the post-crisis years of 2011 – 2016, originations in rural areas recovered by less than did originations in urban areas.

6.1.2. Amounts of Originations to Firms with Revenues less than $1 Million

In addition to collecting information on small-business-loan originations by size of the loan, the FFIEC also collects information on small-business-loan originations to firms with

revenues less than $1 million. Because mid-size and even large firms may borrow in amount less than $1 million, information on firms with revenues less than $1 million is more indicative of lending to truly small businesses.

Figure 5:
SBL Originations, 1996-2016
Originated to Firms with Revenues < $1 Million
Aggregate Dollar Amounts in Urban vs. Rural Areas

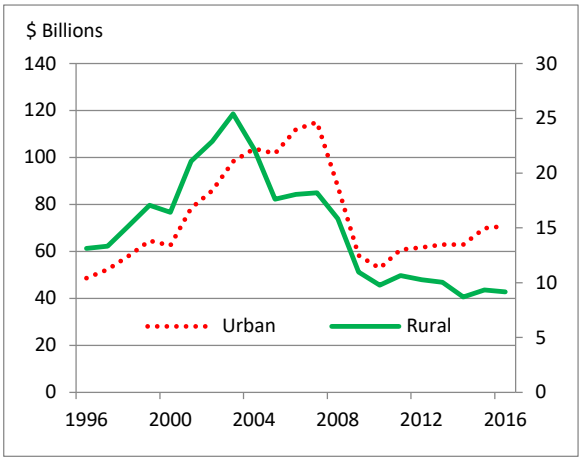
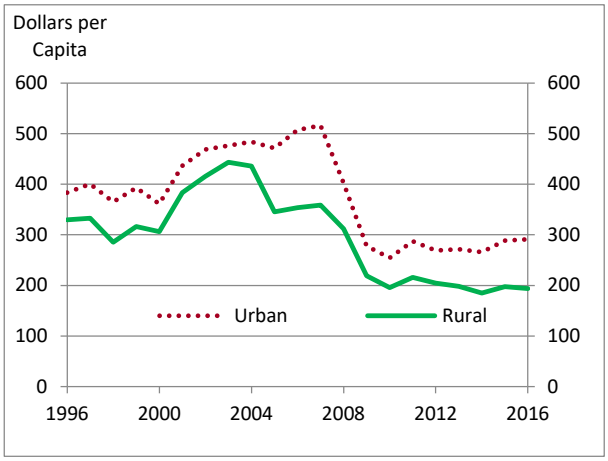


Figure 6:
SBL Originations, 1996-2016
Originated to Firms with Revenues < $1 Million
Average Dollar Amounts per Capita in Urban vs. Rural Areas



Figures 5 and 6 show the aggregate dollar amounts (in $ millions) and average dollar amounts per capita, respectively, of small-business-loan originations to firms with revenues less than $1 million in urban and rural areas. This information also appears in tabular form in Table 3.

As was true for aggregate amounts by loan size, the aggregate loan amounts to firms with revenues less than $1 million peaked during 2007. Originations nationally peaked at $133 billion, of which $115 billion were in urban areas and $18 billion were in rural areas. Overall, originations hit bottom in 2010 at $62.6 billion—a decline of 53%. Originations in urban areas also hit bottom in 2010 down 53%. However, originations in rural areas did not bottom until 2014 down 52%.

By 2016, the aggregate amounts of originations to firms with revenues less than $1 million had rebounded somewhat, but for the nation as a whole remained 40% below the 2007

peak at only $80 billion. In 2016, originations in urban areas were 38% below the peak, but, in rural areas, originations were still 50% below the peak. These results provide support for H3B, that during the post-crisis years of 2011 – 2016, originations in rural areas recovered by less than did originations in urban areas.

As shown in Panel B of Table 3 and Figure 6, the average amount of originations per capita nationally also peaked in 2007 at $486 and in urban areas at $516; however, the peak rural areas occurred in 2003 at $444. Nationally and in urban areas, originations per capita hit bottom in 2010 at $244 and $$255, respectively; but in rural areas, originations per capita hit bottom in 2014 at $185. Since the bottoms, originations per capita have recovered to $291 in urban areas but only to $194 in rural areas.

In summary, the results for average originations to firms with revenues less than $1 million provide support for hypothesis H3B: during the post-crisis years of 2011 – 2016, originations in rural areas recovered by less than did originations in urban areas.

6.1.3. Numbers of Originations by Loan Size

Figures 7 and 8 show the numbers of small-business-loan originations by year for loans less than $100,000 and for loans $100,000 to $1 million, respectively. This information also appears in tabular form in Table 4. As with aggregate amounts, the aggregate numbers of originations peaked during 2007. Nationally the aggregate number of total originations peaked at 13 million, of which 11.5 million were in urban areas and 1.5 million were in rural areas. The number of originations hit bottom in 2010 at 4 million—a decline of 69%. The number of originations in the smaller size bucket (< $100,000) declined by 70% while, in the larger bucket, declined by only 33%. In both urban and rural areas, the percentage declines from 2007 to 2010 are almost identical to the nation as a whole.

Figure 7:
SBL Originations 1996-2016
Originated in Amounts < $100,000
Aggregate Number of Loans in Urban vs. Rural Areas

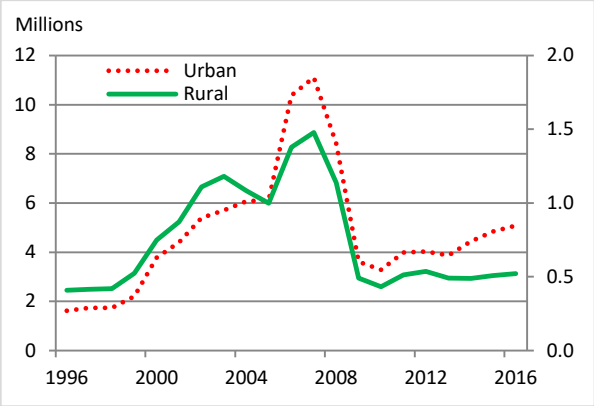


Figure 8:
SBL Originations 1996-2016
Originated in Amounts $100,000 $1 Million
Aggregate Number of Loans in Urban vs. Rural Areas

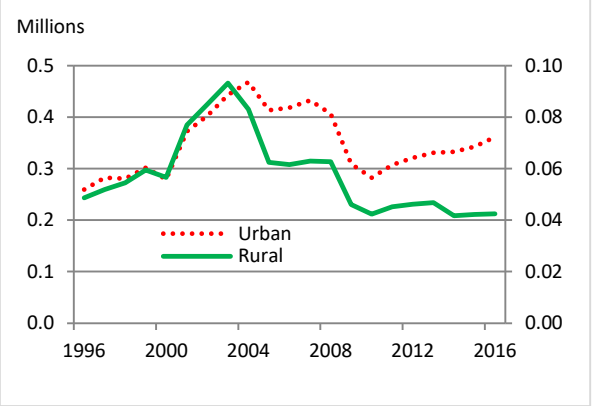


Figure 9:
SBL Originations 1996-2016
Originated in Amounts < $100,000
Average Number of Loans per Capita in Urban vs. Rural Areas

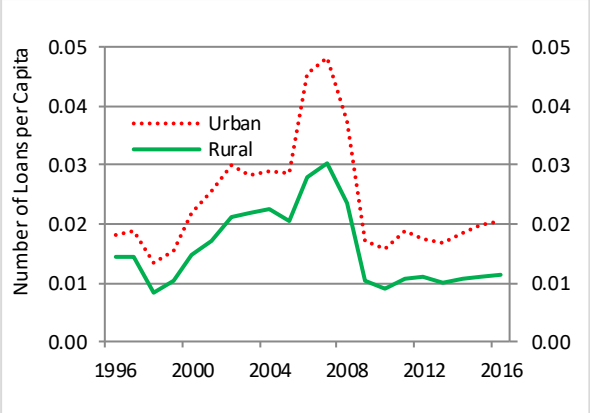
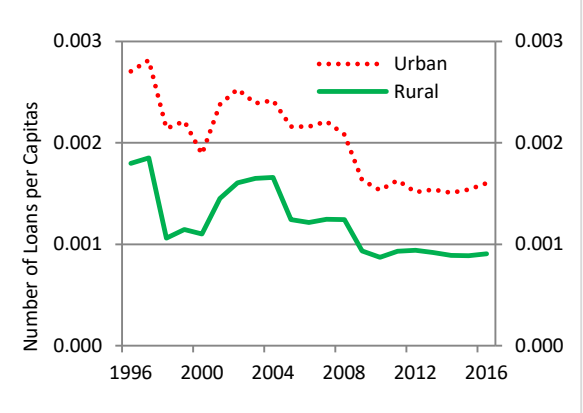


Figure 10:
SBL Originations 1996-2016
Originated in Amounts $100,000 $1 Million
Average Number of Loans per Capita in Urban vs. Rural Areas



By 2016, the numbers of originations had rebounded somewhat, but, nationally, remained 54% below the 2007 peak at only 6.0 billion. Originations in the smaller size bucket remained 55% below the 2007 peak, whereas originations in the larger size bucket were only 19% below the 2007 peak. The recovery in urban areas is almost identical to those at the national level, but once again a different story holds in rural areas, where the aggregate number of originations remains 63% below the 2007 peak.

In summary, the number of originations in both urban and rural areas dropped by almost 70% during the peak crisis years. Since 2010, the rebound in number of originations has been much stronger in urban relative to rural areas. Overall, these results provide support for H3B, that, during the post-crisis years of 2011 – 2016, originations in rural areas recovered by less than did originations in urban areas.

Figures 9 and 10 show the average numbers of small-business-loan originations per capita by year for loans less than $100,000 and for loans $100,000 to $1 million, respectively. This information also appears in tabular form in Table 5. The average numbers of loans per capita peaked during 2007 at 0.047 nationally; at 0.051 in urban areas; and at 0.032 in rural areas. The number of originations per capita hit bottom nationally in 2010 at 0.016—a decline of 66%. Similar percentage declines were seen in both urban and rural areas.

By 2016, the average numbers of originations per capita had rebounded somewhat, but, for the nation as a whole, remained 56% below the 2007 peak at only 0.021. The recovery in urban areas is almost identical to those nationally; but in rural areas, the average number of originations per capita remained at 61% below the 2007 peak.

In summary, the average number of originations per capita in both urban and rural areas dropped by almost 70% during the peak crisis years. Since 2010, the rebound in number of originations has been somewhat stronger in urban relative to rural areas. Overall, these results provide support for H3B, that, during the post-crisis years of 2011 – 2016, originations in rural areas recovered by less than did originations in urban areas.

Figure 11:
SBL Originations 1996-2016
Firms with Revenues < $1 Million
Number of Loans in Urban vs. Rural Areas

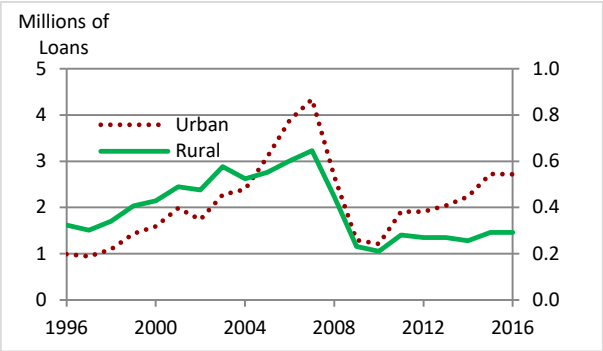
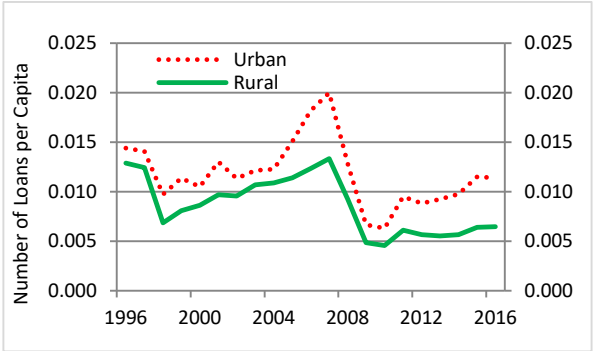


Figure 12:
SBL Originations 1996-2016
Firms with Revenues < $1 Million
Number of Loans per Capita in Urban vs. Rural Areas



6.1.4. Numbers of Originations to Firms with Revenues less than $1 Million

Figures 11 and 12 show the aggregate numbers (in millions) and average numbers per capita, respectively, of small-business-loan originations to firms with revenues less than $1 million. This information also appears in tabular form in Table 6. The aggregate number of loans peaked during 2007 at 5.0 million, of which 4.3 million were in urban areas and 0.6 million were in rural areas. Overall, the aggregate number of originations to firms with revenues less than $1 million hit bottom in 2010 at 1.4 million—a decline of 71%. Both urban and rural areas saw similar declines.

By 2016, the aggregate numbers of originations to firms with revenues less than $1 million had rebounded somewhat, but, nationally, remained 40% below the 2007 peak at only 3.0 billion. The number of originations in urban areas were 37% below the 2007 peak, whereas, in rural areas, remained 55% below the 2007 peak. Once again, these results provide support for H3B, that during the post-crisis years of 2011 – 2016, originations in rural areas recovered by less than did originations in urban areas.

As shown in Figure 12 and Panel B of Table 6, the average numbers of originations per capita to firms with revenues less than $1 million paint a similar picture. The average number of

originations per capita peaked during 2007 at 0.019 nationally; at 0.020 in urban areas and at 0.013 in rural areas. This metric hit bottom in 2010 down 68% nationally. Both urban and rural areas saw similar declines.

By 2016, the average numbers of originations per capita to firms with revenues less than $1 million had rebounded somewhat, but, both nationally and in urban areas, remained 43% below the 2007 peak. In rural areas, this metric remained 51% below the 2007 peak. Once again, these results provide support for H3B, that during the post-crisis years of 2011 – 2016, originations in rural areas recovered by less than did originations in urban areas.

6.2. ***Multivariate Results***

In addition to the univariate evidence presented above, this section presents multivariate evidence based on panel-data regression models analyzing the amounts and numbers of small-business-loan originations. While the univariate results highlight differences in small business lending between Census tracts in urban and rural areas, they do not control for important differences in the characteristics of urban versus rural firms. One important difference is population. Rural areas may have fewer loans simply because they have fewer people. Other important differences are age, income, and employment.

Four models are estimated for four measures of the amounts and four measures of the number of small-business-loan-originations: amounts and numbers of originations in amounts less than $1 million, amounts and numbers of originations in amounts less than $100,000, amounts and numbers of originations in amounts greater than $250,000 and less than $1 million, and amounts and numbers of originations to firms with revenues less than $1 million. For each of the eight dependent variables, the first model (shown in Panel 1) corresponds to eq. (2), and

includes only the control variables, a set of *Year* fixed effects (with 2007 being the omitted "baseline" year), and an indicator for rural Census tracts.[13] The control variables are from the most recently available Census (1990, 2000 or 2010) and include the natural logarithm of tract population, the median family income as a percentage of median MSA income, the ratio of employment to population, and the labor force participation rate (the sum of employment and unemployment divided by population). This model provides for a clean test of hypothesis H1. The second model (shown in Panel 2) augments the first model with an interaction of *Rural* and *Fin'l Crisis* plus an interaction of *Rural* and *Post Crisis*. These interaction terms provide a means for testing hypotheses H2 and H3. The third model (shown in Panel 3) is similar to the second model but replaces the year fixed effects and state fixed effects with a set of 2,000 *State* × *Year* fixed effects, i.e. one indicator for each state and year pair (50 states times 20 years). State and state-year fixed effects are "absorbed" so there are no coefficients for these variables.[14] The fourth model (shown in Panel 4) is similar to the third model but replaces the interaction of *Rural* and *Fin'l Crisis* and the interaction of *Rural* and *Post Crisis* with a set of indicators for rural Census tracts in each year during 2008 – 2016.

6.2.1. Descriptive Statistics

Table 7 presents descriptive statistics for the Census-tract dependent and control variables that are included in the multivariate analysis. During 1996-2016, the Census-tract average amounts of originations in the small, middle, and large size buckets were $1.130 million, $558 thousand and $1.645 million, respectively. The average amount of originations to firms with revenues less than $1 million was $1.383 million. The average numbers of originations in

[13] The first three models also include a set of state fixed effects, but these variables are not shown in the tables.
[14] The averages of all explanatory variables are calculated for each state-year pair and these are subtracted from the values of the explanatory variables, leaving deviations from the means.

the small, medium, and large size buckets were 86.3, 3.2, and 3.1, respectively. The average number of originations to firms with revenues less than $1 million was 38.8. When one compares the average amounts and numbers of originations between urban and rural tracts, one finds that the averages in rural tracts are significantly small. For the average amounts in the small, medium, and large size buckets, rural originations are 67%, 74%, and 53% as large as in urban areas. For the average amount to firms with revenues less than $1 million, rural originations are 81% as large as in urban areas. For the average numbers in the small, medium, and large size buckets, rural originations are 62%, 77%, and 56% as large as in urban areas. For the average number to firms with revenues less than $1 million, rural originations are 74% as large as in urban areas. Table 7 also presents descriptive statistics for five tract-level control variables. The average population was 4,264 but was 4,372 in urban areas and 3,827 in rural areas. The average median family income as a percentage of MSA median family income was 100.35 but was 100.66 in urban areas and 99.10 in rural areas. The average median family age was 35.6 but was 35.2 in urban areas and 37.1 in rural areas. The average employment-population ratio was 59.3 but was 60.2 in urban areas and 55.7 in rural areas. Finally, the average labor-force participation rate was 63.7, but was 64.6 in urban areas and 59.8 in rural areas. Each of these differences in means is statistically significant.

6.2.2. Multivariate Regression Models of the Amount of Small-Business-Loan Originations

Table 8 presents the results from a series of regression models where the dependent variable is the natural logarithm of the amounts of small-business-loan originations in amounts less than $1 million. The adjusted R^2 indicates that the model explains approximately 75% of the variability in the data. Each of the year fixed effects for 2008 – 2016 is estimated with great precision, as indicated by the extremely large t-statistics shown in the first three models.

Figure 13:
Amounts of SBL Originations in Amounts < $1 Million
Percentage Declines from 2007
2008-2016

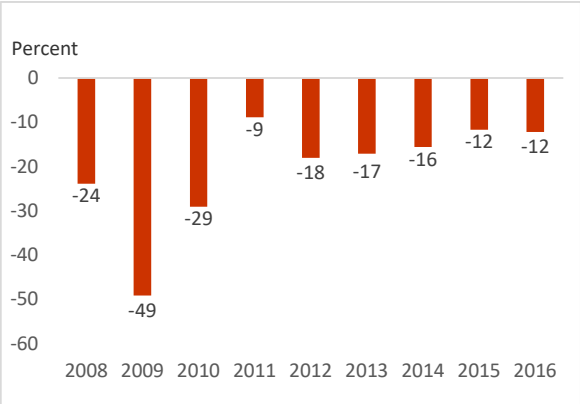
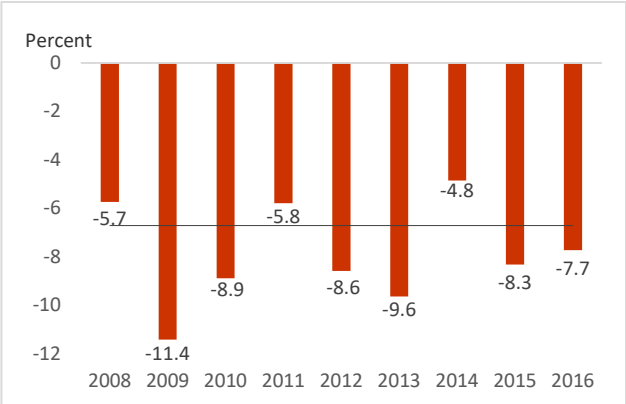


Figure 14:
Amounts of SBL Originations in Amounts < $1 Million
Percentage Differences in Rural Areas during 2008-2016
vs. Urban Areas in 2007



As shown in Figure 13, these coefficients indicate that, relative to the omitted year of 2007, the amounts of originations dropped by 24% in 2008, 49% in 2009, and 29% in 2010.[15] In 2011, originations were down by only 9% relative to 2007, but then deteriorated again during 2012-2014 (down 18%, 17%, and 16%, respectively). During 2015 and 2016, originations remained more than ten percent below those in 2007. Over this same period, total business loans rose by more than 46%.[16] So, almost a decade after the onset of the financial crisis, the amount of small-business-loan originations in amounts less than $1 million remains significantly below pre-crisis levels, even as total business lending has risen by almost half.

The key variables of interest in Table 8 are the indicator for rural Census tracts and the crisis and year interactions with this indicator. Panel 1 includes only an indicator for rural Census tracts, providing a clean test of H1. The highly significant coefficient on *Rural* indicates that, on average, originations in rural areas were exp (-0.073) – 1 = 7.0% lower than originations in urban areas during the sample period 1996 – 2016. This result strongly supports *H1* that originations

[15] In a semi-logarithmic model like this one, one must transform the coefficient to obtain the implied percentage change in the dependent variable. The transformation is to exponentiate the coefficient and then subtract one. In Excel, this calculation is "exp(coefficient) – 1." See Halvorsen and Palmquist (1980).
[16] This figure is based upon the author's calculations using data reported in the FDIC's *Quarterly Banking Profiles*.

throughout the sample period are lower in rural areas than in urban areas. Qualitatively similar results are obtained when the state fixed effects are replaced by *State* × *Year* fixed effects.

In Panel 2, indicator variables for rural Census tracts during the financial crisis years of 2008-2010 and during the post-crisis years of 2011-2016 are added to the specification in Panel 1. The highly significant coefficient on *Rural* declines only slightly, from 0.073 to 0.070. The 0.011 coefficient on *Rural* × *Fin'l Crisis* is statistically significant at the 0.05 level and indicates that, during the financial crisis years, lending in rural areas fell by 1.1 percentage points less than in urban areas. The0.014 coefficient on *Rural* × *Post Crisis* is statistically significant at the 0.01 level and indicates that, during the post crisis years, lending in rural areas fell by 1.4 percentage points more than in urban areas.

In Panel 3, the specification in Panel 2 is changed by replacing the year fixed effects and state fixed effects with a set of *State* ×*Year* fixed effects. This better controls for changes in local economic conditions, as it controls for unobserved state-level heterogeneity in each year. The results in Panel 3 show almost no effect on the coefficient on *Rural* but show that the sign on the coefficient of *Rural* × *Fin'l Crisis* changes from positive to negative, and the coefficient is significant at better than the 0.01 level. The interaction of Rural and post-crisis remains negative and significant, but only at the 0.10 level. These results provide support for H2A that small-business loan originations during the crisis years declined by more at rural than at urban firms, and for H3B that small-business loans during the post-crisis years recovered by less at rural than at urban firms.

In Panel 4, the specification in Panel 3 is altered by replacing the two rural crisis interaction variables with a set of nine *Year* × *Rural* indicators. This model sheds additional light upon changes in rural lending within the two crisis periods. The coefficients for 2009 and 2010

are negative and significant at better than the 0.01 level, while the coefficients for 2008 is positive but not significantly different from zero. Taken together, these results support *H2A* that, during the financial crisis years, originations in rural census tracts declined by a greater percentage than did originations in urban census tracts. During the post crisis years, four of the coefficient are negative (2012, 2013, 2015, and 2016) and two are positive (2011 and 2014). The negative coefficient for 2013 is significant at better than the 0.01 level while the negative coefficient for 2015 is significant at the 0.05 level and the negative coefficient for 2012 is significant at the 0.06 level. Taken together, these results provide weak evidence in favor of H3B that originations in rural census tracts recovered by less than did originations in urban census tracts during the post-crisis years 2011 – 2016.

To calculate the percentage difference for originations in rural areas by year relative to originations to urban firms during the omitted year of 2007, one adds the average effect during the pre-crisis period with the *Year* × *Rural* interaction effect. As shown in Figure 14, the interaction terms indicate that, relative to 2007, originations in rural areas were 5%11% lower during 2008 – 2016.

Table 9 presents the results from a series of regression models where the dependent variable is the natural logarithm of the amount of small-business-loan originations in amounts less than $100,000. This is the smallest of the three size buckets and hence, is better representative of lending to truly small businesses. Data from the Federal Reserve Board's 2003 Survey of Small Businesses indicate that the average small business in the U.S. had only about $60,000 in total assets (Cole and Sokolyk, 2016).

As shown in Figure 15, the year coefficients indicate that, relative to the omitted year of 2007, the amounts of originations in amounts less than $100,000 dropped by 33% in 2008, 58%

in 2009, and 33% in 2010. In 2011, originations were down by only 10% relative to 2007, but then deteriorated again during 2012 – 2013 (down 25% and 22%, respectively). During 2016, originations remained 15% below those in 2007.

Figure 15:
Amounts of SBL Originations in Amounts < $100,000
Percentage Declines from 2007
2008-2016

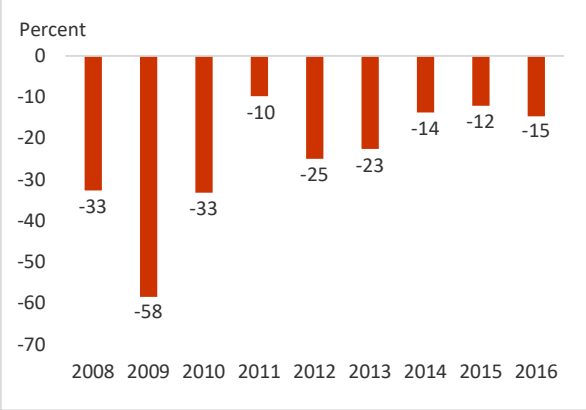
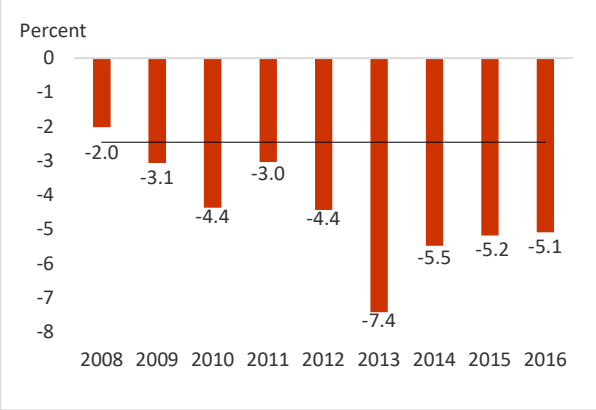


Figure 16:
Amounts of SBL Originations in Amounts < $100,000
Percentage Differences in Rural Areas during 2008-2016
vs. Urban Areas in 2007



In Panel 1, the highly significant coefficient on *Rural* indicates that, on average, originations in rural areas were exp (-0.033) – 1 = 3.2% lower than originations in urban areas during the sample period 1996 – 2016. This result strongly supports *H1* that originations throughout the sample period are lower in rural areas than in urban areas. Qualitatively similar results are obtained when the *State* and *Year* fixed effects are replaced by *State* × *Year* fixed effects.

In Panel 2, indicator variables for rural Census tracts during the financial crisis years of 2008-2010 and during the post-crisis years of 2011-2016 are added to the specification in Panel 1. The highly significant coefficient on *Rural* declines slightly, from 0.033 to 0.026. The 0.022 coefficient on *Rural* × *Fin'l Crisis* is statistically significant at the 0.05 level and indicates that, during the financial crisis years, lending in rural areas fell by 2.2 percentage points less than in urban areas. The0.034 coefficient on *Rural* × *Post Crisis* is statistically significant at the 0.01

level and indicates that, during the post crisis years, lending in rural areas fell by 3.3 percentage points more than in urban areas.

In Panel 3, the specification in Panel 2 is changed by replacing the year fixed effects and state fixed effects with a set of state x year fixed effects. The results in Panel 3 show almost no effect on the coefficient on *Rural* but show that the sign on the coefficient of *Rural* × *Fin'l Crisis* changes from positive to negative, and the coefficient is significant at better than the 0.06 level. The interaction of Rural and post-crisis remains negative and significant at better than the 0.01 level. These results provide support for H2A that small-business loan originations during the crisis years declined by more at rural than at urban firms, and for H3B that small-business loans during the post-crisis years recovered by less at rural than at urban firms.

In Panel 4, the specification in Panel 3 is altered by replacing the two rural crisis interaction variables with a set of nine *Year* × *Rural* indicators. The coefficients for 2009 and 2010 are negative and, for 2010, significant at better than the 0.01 level, while the coefficient for 2008 is positive but not significantly different from zero. Taken together, these results support *H2A* that, during the financial crisis years, originations in rural census tracts declined by a greater percentage than did originations in urban census tracts. During the post crisis years, each of the six coefficients is negative and five are significant at the 0.05 level or better. Taken together, these results provide strong evidence in favor of H3B that originations in rural census tracts recovered by less than did originations in urban census tracts during the post-crisis years 2011 – 2016.

As shown in Figure 16, the interaction terms indicate that originations in rural areas during 2008 – 2016 were 2% 7% lower than in urban areas during 2007.

Table 10 presents the results from a series of regression models where the dependent variable is the natural logarithm of the amounts of small-business-loan originations in the largest size bucket—amounts greater than $250,000 and less than $1 million.

Figure 17:
Amounts of SBL Originations in Amounts $250,000-$1 Million
Percentage Declines from 2007
2008-2016

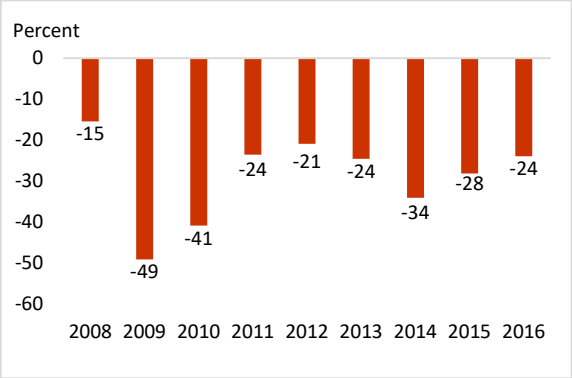


Figure 18:
Amounts of SBL Originations in Amounts $250,000-$1 Million
Percentage Differences in Rural vs. Urban Areas
2008-2016

As shown in Figure 17, the year coefficients indicate that, relative to the omitted year of 2007, the amounts of originations dropped by 15% in 2008, 49% in 2009, and 41% in 2010. In 2011-2016, originations were down by 20% 35% relative to 2007. During 2016, originations remained more than twenty percent below those in 2007.

In Panel 1, the highly significant coefficient on *Rural* indicates that, on average, originations in rural areas were exp (-0.470) – 1 = 37.5% lower than originations in urban areas during the sample period 1996 – 2016. This result strongly supports *H1* that originations throughout the sample period are lower in rural areas than in urban areas. Qualitatively similar results are obtained when the *State* and *Year* fixed effects are replaced by *State* × *Year* fixed effects.

In Panel 2, indicator variables for rural Census tracts during the financial crisis years of 2008-2010 and during the post-crisis years of 2011-2016 are added to the specification in Panel

1. The highly significant coefficient on *Rural* rises slightly, from0.470 to0.499. The 0.083 coefficient on *Rural* × *Fin'l Crisis* is statistically significant at the 0.05 level and indicates that, during the financial crisis years, lending in rural areas fell by 8.7 percentage points less than in urban areas. The 0.058 coefficient on *Rural* × *Post Crisis* is statistically significant at the 0.01 level and indicates that, during the post crisis years, lending in rural areas fell by 5.9 percentage points less than in urban areas.

In Panel 3, the specification in Panel 2 is changed by replacing the year fixed effects and state fixed effects with a set of *State* × *Year* fixed effects. The results in Panel 3 show almost no effect on the coefficient on *Rural* but show that the coefficient of *Rural* × *Fin'l Crisis* declines in magnitude from 0.083 to 0.037 but remains significant at better than the 0.05 level. The interaction of Rural and post-crisis remains positive and significant at better than the 0.101 level. These results provide support for H2B that small-business loan originations during the crisis years declined by less at rural than at urban firms, and support for H3A that small-business loans during the post-crisis years recovered by more at rural than at urban firms.

In Panel 4, the specification in Panel 3 is altered by replacing the two rural crisis interaction variables with a set of nine *Year* × *Rural* indicators. The coefficients for 2008, 2009, and 2010 are positive and, for 2008, significant at better than the 0.05 level. Taken together, these results support *H2B* that, during the financial crisis years, originations in rural census tracts declined by a smaller percentage than did originations in urban census tracts. During the post crisis years, each of the six coefficients is positive and three are significant at the 0.10 level or better. Taken together, these results provide evidence in favor of H3A that originations in rural census tracts recovered by more than did originations in urban census tracts during the post-crisis years 2011 – 2016.

As shown in Figure 18, the interaction terms indicate that originations in rural areas during 2008 – 2016 were 25% 39% lower than in urban areas during 2007.

Table 11 presents the results from a series of regression models where the dependent variable is the natural logarithm of the amount of small-business-loan originations the firms with revenues less than $1 million. Many researchers consider this measure the most representative of lending to truly small businesses. Data from the Federal Reserve Board's 2003 Survey of Small Businesses indicate that the average small business in the U.S. had about $600,000 in revenues (Cole and Sokolyk, 2016).

Figure 19:
Amounts in SBL Originations to Firms with Revenues <$ Million
Percentage Declines from 2007
2008-2016

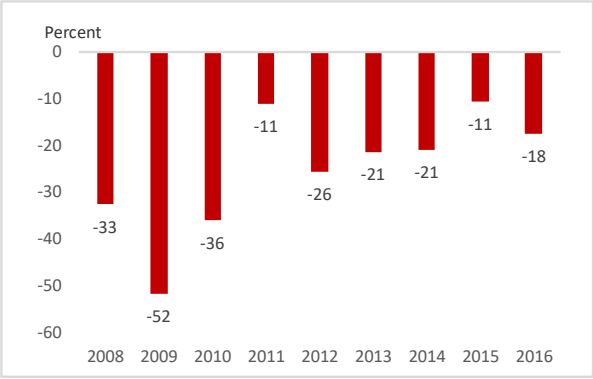
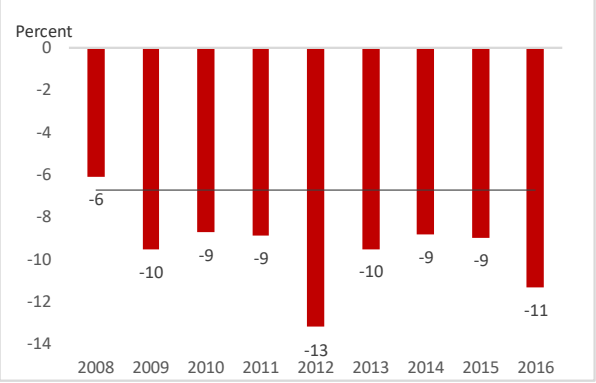


Figure 20:
Amounts in SBL Originations to Firms with Revenues <$1 Million
Percentage Differences in Rural Areas during 2008-2016 vs. Urban Areas in 2007



As shown in Figure 19, the year coefficients indicate that, relative to the omitted year of 2007, the amounts of originations dropped by 33% in 2008, 52% in 2009, and 36% in 2010. In 2011, originations were down by only 12% relative to 2007, but then deteriorated again during 2012 – 2014 (down 25%, 21%, and 22%, respectively). During 2016, originations remained 17% below those in 2007. These are very similar to the results reported for the smallest size bucket of originations shown in Table 7 and Figure 9.

In Panel 1, the highly significant coefficient on *Rural* indicates that, on average, originations in rural areas were exp (-0.078) – 1 = 7.5% lower than originations in urban areas during the sample period 1996 – 2016. This result strongly supports *H1* that originations throughout the sample period are lower in rural areas than in urban areas. Qualitatively similar results are obtained when the state and year fixed effects are replaced by state x year fixed effects.

In Panel 2, indicator variables for rural Census tracts during the financial crisis years of 2008-2010 and during the post-crisis years of 2011-2016 are added to the specification in Panel 1. The highly significant coefficient on *Rural* declines slightly, from 0.078 to 0.065. The 0.022 coefficient on *Rural* × *Fin'l Crisis* is statistically significant at the 0.01 level and indicates that during the financial crisis years, lending in rural areas fell by 2.2 percentage points less than in urban areas. The0.059 coefficient on *Rural* × *Post Crisis* is statistically significant at the 0.01 level and indicates that, during the post crisis years, lending in rural areas fell by 5.7 percentage points more than in urban areas.

In Panel 3, the specification in Panel 2 is changed by replacing the year fixed effects and state fixed effects with a set of *State* × *Year* fixed effects. The results in Panel 3 show almost no effect on the coefficient on *Rural* but show that the sign on the coefficient of *Rural* x *Fin'l Crisis* changes from positive to negative, and the coefficient is significant at better than the 0.05 level. The coefficient of *Rural* × *Post Crisis* remains negative and significant at better than the 0.01 level. These results provide support for H2A that small-business loan originations during the crisis years declined by more at rural than at urban firms, and for H3B that small-business loans during the post-crisis years recovered by less at rural than at urban firms.

In Panel 4, the specification in Panel 3 is altered by replacing the two rural crisis interaction variables with a set of nine *Year* × *Rural* indicators. The coefficients for 2009 and 2010 are negative and significant at better than the 0.10 level, while the coefficient for 2008 is positive but not significantly different from zero. Taken together, these results support *H2A* that, during the financial crisis years, originations in rural census tracts declined by a greater percentage than did originations in urban census tracts. During the post crisis years, each of the six coefficients is negative and significant at the 0.05 level or better. Taken together, these results provide strong evidence in favor of H3B that originations in rural census tracts recovered by less than did originations in urban census tracts during the post-crisis years 2011 – 2016. As shown in Figure 20, the interaction terms indicate that originations in rural areas during 2008 – 2016 were 6% 13% lower than in urban areas during 2007.

6.2.4. Multivariate Regression Models of the Number of Small-Business-Loan Originations

Table 12 presents the results from a series of regression models where the dependent variable is the natural logarithm of the number of small-business-loan originations in amounts less than $1 million. The adjusted R^2 in each of these models is greater than 0.90.

As shown in Figure 21, the year coefficients indicate that, relative to the omitted year of 2007, the numbers of originations dropped by 29% in 2008, 60% in 2009, and 25% in 2010. In 2011, originations were essentially even with 2007, but then deteriorated again during 2012 – 2013 (down 14% and 19%, respectively). During 2014 – 2016, the number of originations remained about eight percent below those in 2007.

In Panel 1, the highly significant coefficient on *Rural* indicates that, on average, originations in rural areas were exp (-0.025) – 1 = 2.4% lower than originations in urban areas

during the sample period 1996 – 2016. This result supports *H1* that originations throughout the sample period are lower in rural areas than in urban areas. Qualitatively similar results are obtained when the state and year fixed effects are replaced by *State* × *Year* fixed effects.

Figure 21:
Numbers of SBL Originations in Amounts < $1 Million
Percentage Declines from 2007
2008-2016

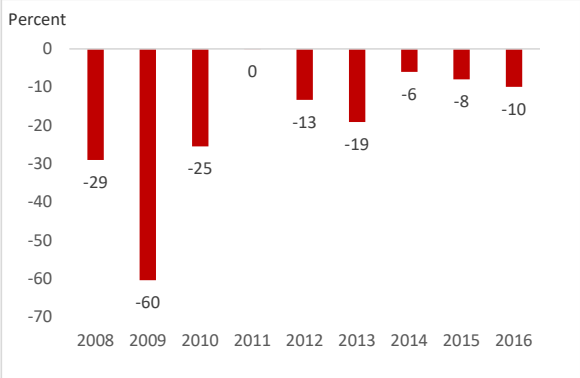
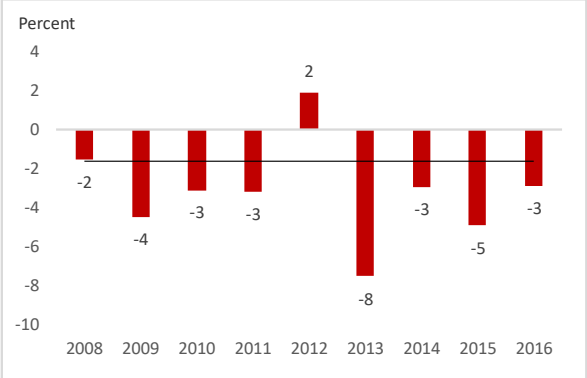


Figure 22:
Numbers of SBL Originations in Amounts < $1 Million
Percentage Differences in Rural Areas during 2008-2016
vs. Urban Areas in 2007



In Panel 2, indicator variables for rural Census tracts during the financial crisis years of 2008-2010 and during the post-crisis years of 2011-2016 are added to the specification in Panel 1. The highly significant coefficient on *Rural* declines slightly, from 0.025 to 0.021. The 0.010 coefficient on *Rural* × *Fin'l Crisis* is statistically significant at the 0.01 level and indicates that during the financial crisis years, lending in rural areas fell by 1.0 percentage points less than in urban areas. The0.019 coefficient on *Rural* × *Post Crisis* is statistically significant at the 0.01 level and indicates that, during the post crisis years, lending in rural areas fell by 1.9 percentage points more than in urban areas.

In Panel 3, the specification in Panel 2 is changed by replacing the *Year* fixed effects and *State* fixed effects with a set of *State* × *Year* fixed effects. The results in Panel 3 show a small reduction in the coefficient on *Rural* but show that the sign on the coefficient of *Rural* × *Fin'l Crisis* changes from positive to negative, and the coefficient is significant at better than the 0.01 level. The coefficient of *Rural* × *Post Crisis* remains negative and significant at better than the

0.01 level. These results provide support for H2A that small-business loan originations during the crisis years declined by more at rural than at urban firms, and for H3B that small-business loans during the post-crisis years recovered by less at rural than at urban firms.

In Panel 4, the specification in Panel 3 is altered by replacing the two rural crisis interaction variables with a set of nine *Year* × *Rural* indicators. The coefficients for 2009 and 2010 are negative and significant at better than the 0.01 level, while the coefficient for 2008 is positive but not significantly different from zero. Taken together, these results support *H2A* that, during the financial crisis years, originations in rural census tracts declined by a greater percentage than did originations in urban census tracts. During the post crisis years, five of the six coefficients are negative and significant at the 0.01 level or better, while R2012 is positive and significant at the 0.01 level. Taken together, these results still provide strong evidence in favor of H3B that originations in rural census tracts recovered by less than did originations in urban census tracts during the post-crisis years 2011 – 2016.

As shown in Figure 22, the interaction terms indicate that originations in rural areas during 2008 – 2016 were 2% 8% lower than in urban areas during 2007, except for 2012 when they were 2% higher.

Table 11 presents the results from a series of regression models where the dependent variable is the natural logarithm of the number of small-business-loan originations in amounts less than $100,000. In general, these results are very similar to those in Table 10 because the number of loans in this size bucket account for the vast majority of all small-business loans, as shown in Figure 4 above.

In Panel 1, the highly significant coefficient on *Rural* indicates that, on average, originations in rural areas were exp (-0.026) – 1 = 2.5% lower than originations in urban areas

during the sample period 1996 – 2016. This result supports *H1* that originations throughout the sample period are lower in rural areas than in urban areas. Qualitatively similar results are obtained when the state and year fixed effects are replaced by state x year fixed effects.

In Panel 2, indicator variables for rural Census tracts during the financial crisis years of 2008-2010 and during the post-crisis years of 2011-2016 are added to the specification in Panel 1. The highly significant coefficient on *Rural* declines slightly, from 0.026 to 0.021. The 0.009 coefficient on *Rural* × *Fin'l Crisis* is statistically significant at the 0.01 level and indicates that during the financial crisis years, lending in rural areas fell by 0.9 percentage points less than in urban areas. The 0.021 coefficients on *Rural* × *Post Crisis* is statistically significant at the 0.01 level and indicates that, during the post crisis years, lending in rural areas fell by 2.0 percentage points more than in urban areas.

In Panel 3, the specification in Panel 2 is changed by replacing the year fixed effects and state fixed effects with a set of state x year fixed effects. The results in Panel 3 show a small reduction in the coefficient on *Rural* but show that the sign on the coefficient of *Rural* × *Fin'l Crisis* changes from positive to negative, and the coefficient is significant at better than the 0.01 level. The coefficient of *Rural* × *Post Crisis* remains negative and significant at better than the 0.01 level. These results provide support for H2A that small-business loan originations during the crisis years declined by more at rural than at urban firms, and for H3B that small-business loans during the post-crisis years recovered by less at rural than at urban firms.

In Panel 4, the specification in Panel 3 is altered by replacing the two rural crisis interaction variables with a set of nine *Year* × *Rural* indicators. The coefficients for 2009 and 2010 are negative and significant at better than the 0.01 level, while the coefficient for 2008 is positive but not significantly different from zero. Taken together, these results support *H2A* that,

during the financial crisis years, originations in rural census tracts declined by a greater percentage than did originations in urban census tracts. During the post crisis years, five of the six coefficients are negative and significant at the 0.01 level or better, while R2012 is positive and significant at the 0.01 level. Taken together, these results still provide strong evidence in favor of H3B that originations in rural census tracts recovered by less than did originations in urban census tracts during the post-crisis years 2011 – 2016.

Table 14 presents the results from a series of regression models where the dependent variable is the natural logarithm of the number of small-business-loan originations in amounts greater than $250,000 and less than $1 million. The adjusted R^2s for these models, in the range of 0.60, are much lower than those for the smallest size bucket (< $100,000) shown in Table 11.

Figure 23:
Numbers of SBL Originations in Amounts $250,000 $1 Million
Percentage Declines from 2007
2008-2016

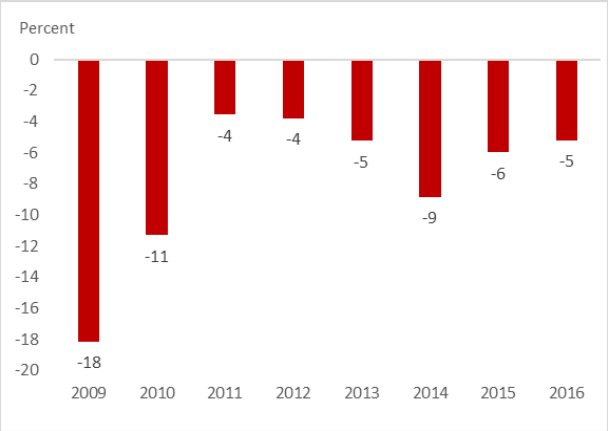
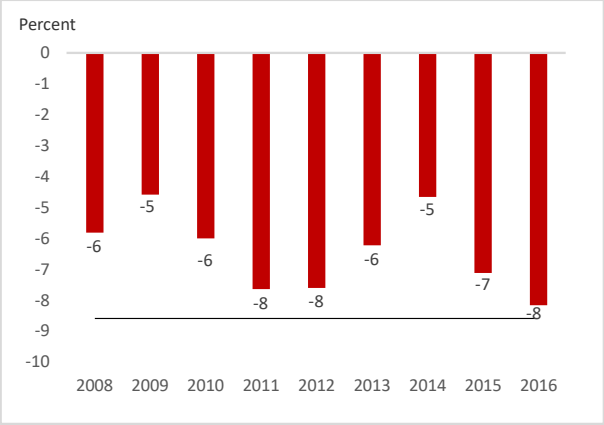


Figure 24:
Numbers of SBL Originations in Amounts $250,000 $1 Million
Percentage Differences in Rural Areas during 2008-2016
vs. Urban Areas in 2007



As shown in Figure 23, the year coefficients indicate that, relative to the omitted year of 2007, the numbers of originations dropped by 6% in 2008, 18% in 2009, and 11% in 2010. These declines are only about one-third as large as those for the number of originations in amounts less than $100,000, but still are both statistically and economically significant. During 2011 – 2012, originations were down only 4%, but then deteriorated somewhat during 2013 – 2014 (down 5%

and 9%, respectively). During 2015 – 2016, the number of originations remained about five percent below those in 2007.

In Panel 1, the highly significant coefficient on *Rural* indicates that, on average, originations in rural areas were exp (-0.079) – 1 = 7.6% lower than originations in urban areas during the sample period 1996 – 2016. This result supports *H1* that originations throughout the sample period are lower in rural areas than in urban areas. Qualitatively similar results are obtained when the state and year fixed effects are replaced by state x year fixed effects.

In Panel 2, indicator variables for rural Census tracts during the financial crisis years of 2008-2010 and during the post-crisis years of 2011-2016 are added to the specification in Panel 1. The highly significant coefficient on *Rural* increases slightly, from 0.079 to 0.088. The 0.038 coefficient on *Rural* × *Fin'l Crisis* is statistically significant at the 0.01 level and indicates that, during the financial crisis years, lending in rural areas fell by 3.9 percentage points less than in urban areas. The 0.013 coefficient on *Rural* × *Post Crisis* is statistically significant at the 0.01 level and indicates that, during the post crisis years, lending in rural areas fell by 1.3 percentage points less than in urban areas.

In Panel 3, the specification in Panel 2 is changed by replacing the year fixed effects and state fixed effects with a set of *State* × *Year* fixed effects. The results in Panel 3 show small changes in the coefficients, but the coefficients on both *Rural* × *Fin'l Crisis* and *Rural* × *Post Crisis* remain positive and significant at better than the 0.01 level. These results provide support for H2B that small-business loan originations during the crisis years declined by less at rural than at urban firms, and for H3A that small-business loans during the post-crisis years recovered by more at rural than at urban firms.

In Panel 4, the specification in Panel 3 is altered by replacing the two rural crisis interaction variables with a set of nine *Year* × *Rural* indicators. The coefficients for 2008, 2009, and 2010 are positive and significant at better than the 0.01 level. Taken together, these results support *H2B* that during the financial crisis years, originations in rural census tracts declined by a smaller percentage than did originations in urban census tracts. During the post crisis years, each of the six coefficients are negative and three are significant at the 0.05 level or better. Taken together, these results provide strong evidence in favor of H3A that originations in rural census tracts recovered by more than did originations in urban census tracts during the post-crisis years 2011 – 2016.

As shown in Figure 24, the interaction terms indicate that originations in rural areas during 2008 – 2016 were 5% 8% lower than in urban areas during 2007.

Table 15 presents the results from a series of regression models where the dependent variable is the natural logarithm of the number of small-business-loan originations to firms with revenues less than $1 million. The adjusted R^2s for these models, in the range of 0.85, are similar to those for the smallest size bucket (< $100,000) shown in Table 9.

As shown in Figure 25, the year coefficients indicate that, relative to the omitted year of 2007, the numbers of originations dropped by 42% in 2008, 59% in 2009, and 29% in 2010. These declines are very similar to those for the number of originations in amounts less than $100,000. During 2011, originations rebounded strongly, up 14% relative to 2007, but then deteriorated during 2012 – 2014 (down 19%, 15%, and 12%, respectively). During 2015, originations were flat relative to 2007, but turned south again during 2016, down 14% from 2007 levels.

Figure 25:
Numbers of SBL Originations to Firms with Revenues $1 Million
Percentage Declines from 2007
2008-2016

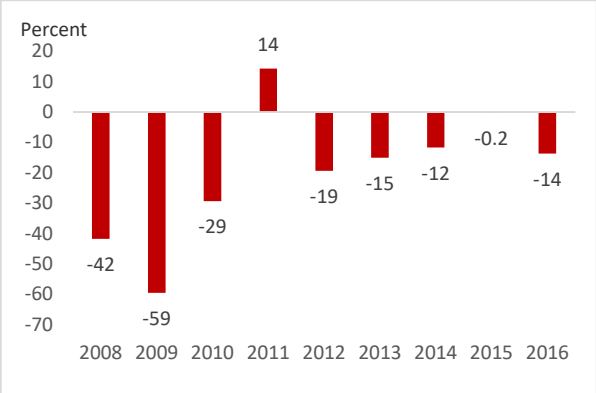
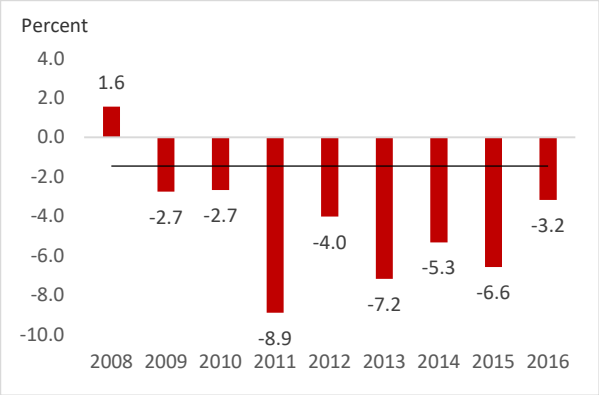


Figure 26:
Numbers of SBL Originations to Firms with Revenues $1 Million
Percentage Differences in Rural Areas during 2008-2016
vs. Urban Areas in 2007



In Panel 1, the significant coefficient on *Rural* indicates that, on average, originations in rural areas were exp (-0.027) – 1 = 2.6% lower than originations in urban areas during the sample period 1996 – 2016. This result supports *H1* that originations throughout the sample period are lower in rural areas than in urban areas. Qualitatively similar results are obtained when the state and year fixed effects are replaced by state x year fixed effects.

In Panel 2, indicator variables for rural Census tracts during the financial crisis years of 2008-2010 and during the post-crisis years of 2011-2016 are added to the specification in Panel 1. The highly significant coefficient on *Rural* declines from 0.026 to 0.015. The 0.043 coefficient on *Rural* × *Fin'l Crisis* is statistically significant at the 0.01 level and indicates that during the financial crisis years, lending in rural areas fell by 4.4 percentage points less than in urban areas. The0.065 coefficient on *Rural* × *Post Crisis* is statistically significant at the 0.01 level and indicates that during the post crisis years, lending in rural areas fell by 6.3 percentage points more than in urban areas.

In Panel 3, the specification in Panel 2 is changed by replacing the year fixed effects and state fixed effects with a set of *State* × *Year* fixed effects. The results in Panel 3 show no change in the coefficient on *Rural* but show that the on the coefficient of *Rural* × *Fin'l Crisis* drops from

0.043 to a statistically insignificant 0.001. The coefficient of *Rural* × *Post Crisis* remains negative and significant at better than the 0.01 level. These results provide no support for H2A or H2B regarding small-business loan originations during the crisis years, but strongly support H3B that small-business loans during the post-crisis years recovered by less at rural than at urban firms.

In Panel 4, the specification in Panel 3 is altered by replacing the two rural crisis interaction variables with a set of nine *Year* × *Rural* indicators. The coefficient for 2008 is positive and significant at better than the 0.01 level, while the coefficients for both 2009 and 2010 are negative and significant at better than the 0.01 level. Taken together, these results provide at least weak support *H2A* that, during the financial crisis years, originations in rural census tracts declined by a greater percentage than did originations in urban census tracts. During the post crisis years, each of the six coefficients are negative and significant at the 0.01 level or better. Taken together, these results still provide strong evidence in favor of H3B that originations in rural census tracts recovered by less than did originations in urban census tracts during the post-crisis years 2011 – 2016.

As shown in Figure 26, the interaction terms indicate that originations in rural areas during 2008 – 2016 were 2% 9% lower than in urban areas during 2007, with the exception of 2008 when they were 2% higher.

6.2.4. Robustness Tests

The models above include the natural logarithm of population as a control variable. Some researchers, such as Conroy *et al*. (2017), prefer to scale the loan data by population rather than include population as a control variable. When the analysis above is repeated using this alternative specification, the results are qualitatively unchanged.

The preferred model above includes year x state fixed effects. When the analysis is repeated using county fixed effects, the results are qualitatively unchanged.

The t-statistics in the models above are based upon robust standard errors. When the analysis is repeated using standard errors clustered at the county or Census tract, the results are qualitatively unchanged.

Figure 27:
Summary of Findings from Multivariate Regression Analysis
Regarding Small-Business-Loan Originations during 1996 – 2016

Hypothesis		Dependent Variable							
		Amounts <$1M	Amounts <$100K	Amounts $250K-$1M	Amounts Revenues <$1M	Numbers <$1M	Numbers <$100K	Numbers $250K-$1M	Numbers Revenues <$1M
H1	Small-business loan originations throughout the sample period are **lower** in rural census tracts than in urban census tracts.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.
H2A	During the crisis years 2008-2010, small-business loan originations in rural census tracts declined by a **greater** percentage than did originations in urban census tracts during those years.	Yes.	Yes.	No.	Yes.	Yes.	Yes.	No.	No.
H2B	During the crisis years 2008-2010, small-business loan originations in rural census tracts declined by **no more than** did originations in urban census tracts during those years.	No.	No.	Yes.	No.	No.	No.	Yes.	No.
H3A	During the post-crisis years 2011-2016, small-business loan originations in rural census tracts recovered by a **greater** percentage than did originations in urban census tracts during those years.	No.	No.	Yes.	No.	No.	No.	Yes.	No.
H3B	During the post-crisis years 2011-2016, small-business loan originations in rural census tracts recovered by **less** than did originations in urban census tracts during those years.	Yes.	Yes.	No.	Yes.	Yes.	Yes.	No.	Yes.

6.2.5. Summary of Findings from Multivariate Regression Analysis

Figure 27 summarizes the findings from the multivariate regression analysis presented in Tables 613 and discussed above. Each of the eight models provides support for H1, which hypothesized that small-business-loan originations throughout the sample period are lower in rural census tracts than in urban census tracts. The average differentials are not only statistically significant, they also are economically significant. For the largest size bucket of loans, the amount of originations in rural areas was lower by 37 percent per year, while the number of originations in rural areas was lower by eight percent per year.

Six of the eight models provide support for H2A, which hypothesized that, during the crisis years 2008-2010, small-business loan originations in rural census tracts declined by a greater percentage than did originations in urban census tracts during those years. The same six models provide support for H3B, which hypothesized that, during the post-crisis years 2011-2016, small-business-loan originations in rural census tracts recovered by less than did originations in urban census tracts during those years.

The two models that failed to support both H2A and H3B were the models where the dependent variables were the numbers and the amounts of originations in amounts of $250,000 $1 Million. This is the largest of the three size buckets of small-business loans, and many in the past have argued that such loans are more representative of mid-market firms rather than of small-businesses.

The finding here certainly suggests that there are fundamental differences in these larger loans and the loans in the smallest size bucket as well as loans originated to firms with revenues less than $1 million. Bankers and industry analysts have argued that there are large fixed-amount origination costs that have increased in the Dodd-Frank era, making smaller loans increasing less profitable, or even unprofitable. The results reported here suggest that banks reporting the CRA data analyzed in this study have disproportionately reduced their rural lending in the form of smaller loans in favor of larger loans.

7. Summary and Conclusions

As the first rigorous analysis based upon tract-level loan origination data on how the financial crisis and post-crisis recovery impacted bank lending to rural U.S. small businesses, the current study provides both academics and policymakers with new insights into how the financial crisis and post-crisis recovery have affected the availability of credit to small rural firms as compared with urban small firms. It also details how to tailor macroeconomic policies, regulations, and taxes to help rural small businesses to obtain needed credit. This is critically important because theory suggests that credit-constrained firms will be 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).

The analysis reveals that small-business-loan originations collapsed during the financial crisis in both urban and rural areas, but, during post-crisis years, rural originations have recovered to a much lesser extent than have urban originations.

The multivariate analysis reveals strong differences in the recovery by size of loan. Post-crisis, originations of loans in amount > $250,000 - $1 million have been stronger in rural areas than in urban areas, while originations of smaller loans have been much weaker in rural areas relative to urban areas.

From a policy perspective, the results lead to several recommendations. The most obvious is for regulators and policymakers to incentivize banks to originate more small-business loans in rural and other less-served areas, such as low-income and minority areas. One such option being discussed is to count such loans as “community development loans” when evaluating a bank’s CRA rating. This would seem to be an especially promising avenue for

incentivizing the "big four" banks with at least $1 trillion in assets that control almost half of industry assets. Another option would be to expand both the number and amount of loans in rural areas that are guaranteed by U.S. Small Business Administration loans. Such guarantees reduce potential losses from making loans and should increase the supply of credit in favored areas.

Another policy would be to reduce the underwriting burden on banks that make small-business loans in terms of documentation for exam classification purposes. Many in the banking industry have blamed increased underwriting burden from the Dodd-Frank Act as one reason for the sluggish bank lending to small businesses (see Decker *et al*. (2016), and Bordo and Duca, (2018)). Such "low-doc" loans were used with some success during the 1991-1993 credit crisis.

Yet another policy would be to encourage the growth of small-business lending by nonbank lenders. Recent changes to small-business loan limits on the almost 6,000 U.S. credit unions are one such action. A credit union had been limited to investing 12.25 percent of its total assets in business loans to members, and many credit unions had reached this limit; the proposed change increases this limit to 27.5 percent of assets. Credit union lending to small businesses has more than doubled from 2008 to 2016, from $30 billion to $60 billion, while bank lending to small businesses over the same period has declined by almost $100 billion.

Finally, policymakers and regulators should be careful not to strangle the nascent FinTech industry, which is growing its small-business lending portfolio at triple-digit rates. There are calls to more strictly regulate firms in this industry, which may prevent these firms from serving as a viable alternative to commercial bank lenders.

Certainly, additional research is called for on this important issue. The current study is limited by the use of aggregate data, albeit at a very granular level. Such data to not allow one to provide evidence on what types of banks have disproportionately reduced their lending in rural

areas. Future research should look at what types of banks are responsible for the results documented here. For example, is this result attributable to a decline in rural lending by the largest banks, which have become much larger since the onset of the financial crisis? The current analysis also is limited by the coverage of the CRA origination data. Only banks with more than $1 billion in assets are required to file the CRA reports that are the source of the data. Are community banks and credit unions stepping in to fill the void in rural lending left by the banks required to report CRA data? This would be a fruitful avenue for future research.

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Tables

Table 1: Dollar Amounts of Small-Business-Loan Originations by Loan Size, 1996-2016
This table presents the dollar amount (in $ Billions) of small-business-loan originations by year for the 50 U.S. states and separately for urban and rural areas in the 50 U.S. states. Amounts are shown for three size buckets of loans: less than $100,000, $100,000 to $250,000, and $250,000 to $1 million, as well as for the total of these three size buckets. Also shown for 2008-2016 is the percentage change in the amounts of total originations from the 2007 peak. Amounts are the author's calculations based upon census-tract-level data downloaded from the website of the U.S. Federal Financial Institution Examination Council (FFIEC) at www.ffiec.gov.

	All					Urban						Rural					
Year	>$100K	>$250K	>$1M	All	From Peak	Year	>$100K	>$250K	>$1M	All	From Peak	Year	>$100K	>$250K	>$1M	All	From Peak
1996	41.4	29.1	72.2	142.7		1996	33.0	24.2	62.7	119.9		1996	8.4	4.9	9.5	22.9	
1997	44.9	31.7	78.7	155.3		1997	36.1	26.4	68.5	131.1		1997	8.8	5.3	10.1	24.2	
1998	43.7	31.5	79.1	154.3		1998	35.0	26.0	68.5	129.5		1998	8.6	5.5	10.6	24.8	
1999	48.8	33.9	85.3	167.9		1999	39.1	27.9	73.7	140.7		1999	9.7	6.0	11.5	27.3	
2000	58.8	31.8	79.5	170.1		2000	48.0	26.0	68.5	142.4		2000	10.9	5.8	11.0	27.6	
2001	64.8	41.7	109.3	215.8		2001	52.3	33.9	94.1	180.4		2001	12.5	7.7	15.2	35.4	
2002	77.6	44.6	121.2	243.4		2002	63.2	36.1	103.9	203.1		2002	14.4	8.4	17.4	40.2	
2003	82.1	48.4	136.0	266.5		2003	67.0	39.3	116.5	222.7		2003	15.1	9.2	19.5	43.7	
2004	90.5	49.6	141.6	281.8		2004	76.5	41.4	124.2	242.1		2004	14.0	8.2	17.5	39.6	
2005	93.3	42.0	127.0	262.3		2005	80.8	36.0	113.2	229.9		2005	12.5	6.1	13.8	32.3	
2006	123.2	42.1	129.3	294.7		2006	108.6	36.2	115.5	260.3		2006	14.7	5.9	13.8	34.4	
2007	141.4	43.3	134.7	319.4		2007	125.1	37.3	120.3	282.8		2007	16.2	6.0	14.3	36.6	
2008	109.9	40.7	128.8	279.4	-12.5%	2008	96.8	34.8	114.4	245.9	-13.0%	2008	13.1	5.9	14.5	33.5	-8.3%
2009	58.1	30.7	97.9	186.7	-41.5%	2009	50.5	26.3	87.2	164.1	-42.0%	2009	7.6	4.4	10.7	22.6	-38.3%
2010	52.7	28.0	89.8	170.5	-46.6%	2010	46.0	24.0	79.8	149.8	-47.0%	2010	6.8	4.0	9.9	20.7	-43.5%
2011	62.4	30.2	97.4	190.0	-40.5%	2011	54.7	26.0	86.6	167.3	-40.8%	2011	7.7	4.2	10.8	22.7	-38.1%
2012	60.1	30.6	104.1	194.9	-39.0%	2012	52.9	26.4	92.8	172.2	-39.1%	2012	7.2	4.2	11.3	22.7	-37.9%
2013	61.5	31.4	107.8	200.7	-37.2%	2013	54.2	27.2	96.3	177.7	-37.1%	2013	7.2	4.2	11.5	22.9	-37.4%
2014	68.2	31.9	104.5	204.6	-35.9%	2014	61.2	28.0	94.7	183.9	-35.0%	2014	7.0	3.9	9.8	20.7	-43.5%
2015	75.9	32.6	108.0	216.5	-32.2%	2015	68.3	28.7	98.1	195.1	-31.0%	2015	7.5	3.9	9.9	21.4	-41.6%
2016	80.7	34.7	111.0	226.3	-29.1%	2016	72.9	30.7	101.1	204.7	-27.6%	2016	7.8	4.0	9.9	21.6	-40.9%

Table 2: Dollar Amounts per Capita of Small-Business-Loan Originations by Loan Size, 1996-2016

This table presents the dollar amount per capita of small-business-loan originations by year for the 50 U.S. states and separately for urban and rural areas in the 50 U.S. states. Amounts are shown for three size buckets of loans: less than $100,000, $100,000 to $250,000, and $250,000 to $1 million, as well as for the total of these three size buckets. Also shown for selected years is the percentage change in the amounts of total originations from their peaks. Amounts are the author's calculations based upon census-tract-level data downloaded from the website of the U.S. Federal Financial Institution Examination Council (FFIEC) at www.ffiec.gov.

	All					Urban						Rural					
Year	>$100K	>$250K	>$1M	All	From Peak	Year	>$100K	>$250K	>$1M	All	From Peak	Year	>$100K	>$250K	>$1M	All	From Peak
1996	292	212	473	977		1996	306	228	523	1,058		1996	246	158	310	714	
1997	305	221	495	1,022		1997	321	239	550	1,109		1997	254	165	318	737	
1998	230	169	397	796		1998	249	188	456	892		1998	168	106	203	477	
1999	247	175	416	837		1999	265	194	475	934		1999	187	114	219	520	
2000	270	155	370	795		2000	288	169	418	875		2000	210	110	209	529	
2001	297	194	482	973		2001	315	209	543	1,067		2001	239	145	279	663	
2002	343	205	526	1,075		2002	364	220	589	1,173		2002	274	158	320	752	
2003	326	198	527	1,050		2003	340	207	577	1,124		2003	275	162	341	777	
2004	353	201	544	1,098		2004	369	210	590	1,169		2004	285	164	344	793	2.1%
2005	358	172	491	1,022		2005	382	184	542	1,109		2005	255	121	271	646	-16.9%
2006	453	170	496	1,119		2006	489	183	549	1,220		2006	297	117	268	682	-12.3%
2007	511	174	510	1,195		2007	552	187	564	1,303		2007	331	119	279	729	-6.2%
2008	406	164	488	1,058		2008	438	175	536	1,148		2008	268	118	283	668	-14.0%
2009	229	127	385	741	-30.0%	2009	245	136	425	806	-29.8%	2009	156	88	213	457	-41.2%
2010	210	119	360	689	-34.9%	2010	226	127	396	750	-34.7%	2010	141	82	201	424	-45.5%
2011	244	126	383	753	-28.8%	2011	263	135	421	819	-28.6%	2011	163	86	216	465	-40.1%
2012	217	116	372	705.8	-33.3%	2012	232	123	404	759	-33.8%	2012	148	86	224	458	-41.1%
2013	219	118	380	717.4	-32.2%	2013	236	125	414	775	-32.5%	2013	145	84	223	452	-41.9%
2014	239	118	366	723	-31.6%	2014	256	125	398	779	-32.1%	2014	151	83	206	441	-43.3%
2015	261	120	375	756	-28.5%	2015	281	127	409	816	-28.9%	2015	162	83	207	452	-41.9%
2016	274	126	382	782	-26.1%	2016	295	134	416	846	-26.3%	2016	168	85	207	460	-40.8%

Table 3: Amounts of Small-Business-Loan Originations to Firms with Revenues < $1 Million, 1996-2016

This table presents, in Panel A, the dollar amounts (in $ Billions) and, in Panel B, the dollar amounts per capita (in $) of small-business-loan originations by year for the 50 U.S. states and separately for urban and rural areas in the 50 U.S. states. Amounts are shown for loans: originated to firms with revenues less than $1 million. Also shown for 2008-2016 is the percentage change in the amounts of total originations from the 2007 peak. Amounts are the author's calculations based upon census-tract-level data downloaded from the website of the U.S. Federal Financial Institution Examination Council (FFIEC) at www.ffiec.gov.

	All		Urban			Rural				All		Urban			Rural		
Year	Amount	From Peak	Year	Amount	From Peak	Year	Amount	From Peak	Year	Amount	From Peak	Year	Amount	From Peak	Year	Amount	From Peak
1996	62		1996	49		1996	13.1		1996	371		1996	383		1996	330	
1997	66		1997	52		1997	13.3		1997	385		1997	400		1997	333	
1998	73		1998	58		1998	15.2		1998	347		1998	365		1998	285	
1999	82		1999	65		1999	17.1		1999	375		1999	393		1999	317	
2000	79		2000	62		2000	16.4		2000	348		2000	361		2000	306	
2001	100		2001	78		2001	21.1		2001	424		2001	437		2001	383	
2002	109		2002	86		2002	22.9		2002	456		2002	468		2002	416	
2003	124		2003	98		2003	25.4		2003	469		2003	476		2003	444	
2004	126		2004	104		2004	22.2		2004	475		2004	484		2004	436	
2005	119		2005	102		2005	17.6		2005	448		2005	471		2005	346	
2006	130		2006	112		2006	18.0		2006	478		2006	507		2006	354	
2007	133		2007	115		2007	18.2		2007	486		2007	516		2007	359	
2008	104	-22.3%	2008	88	-23.7%	2008	15.8	-12.9%	2008	385	-20.8%	2008	402	-22.0%	2008	312	-13.1%
2009	69	-48.0%	2009	58	-49.3%	2009	11.0	-39.7%	2009	267	-45.1%	2009	278	-46.1%	2009	219	-39.0%
2010	63	-53.0%	2010	53	-54.1%	2010	9.8	-46.3%	2010	244	-49.9%	2010	255	-50.7%	2010	196	-45.4%
2011	71	-46.5%	2011	61	-47.2%	2011	10.6	-41.5%	2011	274	-43.6%	2011	288	-44.3%	2011	216	-39.8%
2012	72	-46.0%	2012	62	-46.4%	2012	10.3	-43.5%	2012	257	-47.1%	2012	269	-47.9%	2012	204	-43.1%
2013	73	-45.2%	2013	63	-45.3%	2013	10.0	-44.8%	2013	259	-46.8%	2013	272	-47.3%	2013	198	-44.8%
2014	72	-46.2%	2014	63	-45.2%	2014	8.7	-52.2%	2014	253	-48.0%	2014	266	-48.4%	2014	185	-48.4%
2015	79	-40.6%	2015	70	-39.3%	2015	9.3	-48.7%	2015	274	-43.7%	2015	289	-44.0%	2015	198	-44.9%
2016	80	-40.0%	2016	70.8	-38.5%	2016	9.2	-49.7%	2016	274.8	-43.5%	2016	291	-43.6%	2016	194	-46.0%

Table 4: Numbers of Small-Business-Loan Originations by Loan Size, 1996-2016

This table presents the numbers of small-business-loan originations (in millions of loans) by year for the 50 U.S. states and separately for urban and rural areas in the 50 U.S. states. Numbers are shown for three size buckets of loans: less than $100,000, $100,000 to $250,000, and $250,000 to $1 million, as well as for the total of these three size buckets. Also shown for 2008-2016 is the percentage change in the numbers of total originations from the 2007 peak. Numbers are the author's calculations based upon census-tract-level data downloaded from the website of the U.S. Federal Financial Institution Examination Council (FFIEC) at www.ffiec.gov.

	All					Urban						Rural					
Year	>$100K	>$250K	>$1M	All	From Peak	Year	>$100K	>$250K	>$1M	All	From Peak	Year	>$100K	>$250K	>$1M	All	From Peak
1996	2.02	0.169	0.139	2.33		1996	1.61	0.140	0.120	1.87		1996	0.41	0.030	0.019	0.46	
1997	2.16	0.183	0.151	2.49		1997	1.74	0.151	0.131	2.03		1997	0.42	0.032	0.020	0.47	
1998	2.15	0.182	0.153	2.49		1998	1.73	0.149	0.131	2.01		1998	0.42	0.033	0.021	0.47	
1999	2.73	0.196	0.165	3.09		1999	2.20	0.160	0.142	2.51		1999	0.52	0.036	0.023	0.58	
2000	4.53	0.183	0.153	4.87		2000	3.78	0.148	0.131	4.06		2000	0.75	0.034	0.022	0.81	
2001	5.27	0.239	0.210	5.72		2001	4.40	0.193	0.179	4.77		2001	0.87	0.046	0.031	0.95	
2002	6.51	0.256	0.232	7.00		2002	5.40	0.206	0.197	5.80		2002	1.11	0.050	0.035	1.20	
2003	6.89	0.277	0.259	7.43		2003	5.71	0.223	0.221	6.15		2003	1.18	0.054	0.039	1.28	
2004	7.16	0.282	0.269	7.71		2004	6.07	0.234	0.234	6.54		2004	1.08	0.048	0.035	1.17	
2005	7.13	0.238	0.238	7.60		2005	6.13	0.202	0.211	6.54		2005	1.00	0.035	0.027	1.06	
2006	11.76	0.239	0.241	12.24		2006	10.38	0.204	0.214	10.80		2006	1.38	0.035	0.027	1.44	
2007	12.58	0.245	0.251	13.08		2007	11.11	0.210	0.223	11.54		2007	1.48	0.035	0.028	1.54	
2008	9.55	0.230	0.239	10.02	-23.4%	2008	8.41	0.195	0.211	8.82	-23.6%	2008	1.14	0.035	0.028	1.20	-22.0%
2009	4.10	0.173	0.182	4.45	-65.9%	2009	3.61	0.148	0.161	3.92	-66.1%	2009	0.49	0.025	0.021	0.54	-65.0%
2010	3.72	0.158	0.167	4.05	-69.0%	2010	3.29	0.135	0.148	3.57	-69.0%	2010	0.43	0.023	0.019	0.48	-69.1%
2011	4.50	0.172	0.181	4.85	-62.9%	2011	3.99	0.147	0.160	4.29	-62.8%	2011	0.51	0.024	0.021	0.56	-63.8%
2012	4.56	0.174	0.193	4.92	-62.4%	2012	4.02	0.150	0.171	4.34	-62.4%	2012	0.54	0.024	0.022	0.58	-62.2%
2013	4.37	0.179	0.199	4.74	-63.7%	2013	3.87	0.154	0.177	4.20	-63.6%	2013	0.49	0.025	0.022	0.54	-65.0%
2014	4.93	0.182	0.192	5.30	-59.5%	2014	4.44	0.159	0.174	4.77	-58.7%	2014	0.49	0.023	0.019	0.53	-65.5%
2015	5.36	0.186	0.198	5.74	-56.1%	2015	4.85	0.163	0.179	5.19	-55.0%	2015	0.51	0.023	0.019	0.55	-64.3%
2016	5.60	0.20	0.20	6.00	-54.1%	2016	5.08	0.176	0.186	5.44	-52.9%	2016	0.52	0.024	0.019	0.56	-63.3%

Table 5: Numbers of Small-Business-Loan Originations per Capita by Loan Size, 1996-2016

This table presents the average numbers of small-business-loan originations per capita by year for the 50 U.S. states and separately for urban and rural areas in the 50 U.S. states. Numbers are shown for three size buckets of loans: less than $100,000, $100,000 to $250,000, and $250,000 to $1 million, as well as for the total of these three size buckets. Also shown for selected years is the percentage change in the numbers of total originations from their respective peak. Numbers are the author's calculations based upon census-tract-level data downloaded from the website of the U.S. Federal Financial Institution Examination Council (FFIEC) at www.ffiec.gov.

	All					Urban						Rural					
Year	>$100K	>$250K	>$1M	All	From 2007	Year	>$100K	>$250K	>$1M	All	From 2007	Year	>$100K	>$250K	>$1M	All	From 2007
1996	0.0172	0.00131	0.00118	0.0197		1996	0.0181	0.00141	0.00130	0.0208		1996	0.0144	0.00099	0.00081	0.0162	
1997	0.0177	0.00136	0.00123	0.0203		1997	0.0187	0.00146	0.00135	0.0215		1997	0.0145	0.00103	0.00082	0.0164	
1998	0.0123	0.00101	0.00088	0.0142		1998	0.0135	0.00112	0.00102	0.0156		1998	0.0084	0.00064	0.00042	0.0094	
1999	0.0141	0.00104	0.00092	0.0161		1999	0.0153	0.00115	0.00106	0.0175		1999	0.0103	0.00069	0.00046	0.0115	
2000	0.0202	0.00091	0.00079	0.0220		2000	0.0219	0.00099	0.00090	0.0238		2000	0.0147	0.00066	0.00044	0.0158	
2001	0.0235	0.00114	0.00103	0.0257		2001	0.0255	0.00122	0.00116	0.0279		2001	0.0170	0.00087	0.00058	0.0184	
2002	0.0280	0.00120	0.00111	0.0303		2002	0.0300	0.00128	0.00125	0.0325		2002	0.0213	0.00094	0.00067	0.0229	
2003	0.0269	0.00115	0.00108	0.0291		2003	0.0283	0.00120	0.00119	0.0307		2003	0.0218	0.00096	0.00069	0.0234	
2004	0.0277	0.00116	0.00111	0.0299		2004	0.0289	0.00121	0.00121	0.0313		2004	0.0225	0.00097	0.00069	0.0241	
2005	0.0271	0.00099	0.00100	0.0291		2005	0.0287	0.00106	0.00110	0.0308		2005	0.0205	0.00071	0.00054	0.0217	
2006	0.0424	0.00098	0.00100	0.0444		2006	0.0457	0.00105	0.00111	0.0479		2006	0.0281	0.00069	0.00053	0.0293	
2007	0.0449	0.00100	0.00103	0.0469		2007	0.0483	0.00107	0.00114	0.0505		2007	0.0303	0.00069	0.00055	0.0315	
2008	0.0347	0.00094	0.00098	0.0367	-21.9%	2008	0.0374	0.00100	0.00108	0.0394	-21.9%	2008	0.0234	0.00069	0.00056	0.0247	-21.8%
2009	0.0159	0.00073	0.00077	0.0174	-62.8%	2009	0.0173	0.00078	0.00085	0.0189	-62.6%	2009	0.0102	0.00051	0.00042	0.0112	-64.6%
2010	0.0147	0.00068	0.00072	0.0161	-65.7%	2010	0.0159	0.00073	0.00080	0.0175	-65.4%	2010	0.0091	0.00048	0.00039	0.0100	-68.3%
2011	0.0174	0.00073	0.00077	0.0189	-59.8%	2011	0.0189	0.00078	0.00085	0.0205	-59.4%	2011	0.0108	0.00050	0.00043	0.0118	-62.7%
2012	0.0163	0.00067	0.00074	0.0177	-62.3%	2012	0.0174	0.00071	0.00080	0.0189	-62.5%	2012	0.0111	0.00050	0.00044	0.0120	-62.0%
2013	0.0155	0.00068	0.00075	0.0170	-63.9%	2013	0.0167	0.00072	0.00082	0.0183	-63.8%	2013	0.0099	0.00049	0.00043	0.0109	-65.6%
2014	0.0172	0.00068	0.00072	0.0186	-60.4%	2014	0.0184	0.00072	0.00079	0.0200	-60.5%	2014	0.0107	0.00049	0.00040	0.0116	-63.2%
2015	0.0184	0.00069	0.00074	0.0198	-57.8%	2015	0.0198	0.00073	0.00081	0.0214	-57.6%	2015	0.0111	0.00049	0.00040	0.0120	-62.1%
2016	0.019	0.00073	0.00075	0.0205	-56.2%	2016	0.0206	0.00078	0.00082	0.0222	-56.1%	2016	0.0114	0.00050	0.00040	0.0123	-61.0%

Table 6: Numbers of Small-Business-Loan Originations to Firms with Revenues < $1 Million, 1996-2016

This table presents, in Panel A, the numbers (in millions), and, in Panel B, the numbers per capita, of small-business-loan originations by year for the 50 U.S. states and separately for urban and rural areas in the 50 U.S. states. Numbers are shown for loans originated to firms with revenues less than $1 million. Also shown for 2008-2016 is the percentage change in the numbers of total originations from the 2007 peak. Numbers are the author's calculations based upon census-tract-level data downloaded from the website of the U.S. Federal Financial Institution Examination Council (FFIEC) at www.ffiec.gov.

Panel A: Number of Loans (Millions)									Panel B: Number of Loans per Capita								
	All			Urban			Rural			All			Urban			Rural	
Year	Number	From Peak	Year	Number	From Peak	Year	Number	From Peak	Year	Number	From Peak	Year	Number	From Peak	Year	Number	From Peak
1996	1.320		1996	0.996		1996	0.324		1996	0.0140		1996	0.0144		1996	0.0129	
1997	1.247		1997	0.945		1997	0.302		1997	0.0137		1997	0.0141		1997	0.0124	
1998	1.437		1998	1.097		1998	0.340		1998	0.0091		1998	0.0097		1998	0.0069	
1999	1.838		1999	1.431		1999	0.406		1999	0.0106		1999	0.0114		1999	0.0081	
2000	2.019		2000	1.590		2000	0.429		2000	0.0101		2000	0.0105		2000	0.0086	
2001	2.476		2001	1.986		2001	0.489		2001	0.0122		2001	0.0130		2001	0.0097	
2002	2.212		2002	1.736		2002	0.475		2002	0.0109		2002	0.0113		2002	0.0096	
2003	2.850		2003	2.273		2003	0.577		2003	0.0118		2003	0.0121		2003	0.0107	
2004	2.918		2004	2.394		2004	0.524		2004	0.0120		2004	0.0123		2004	0.0109	
2005	3.645		2005	3.093		2005	0.552		2005	0.0144		2005	0.0151		2005	0.0114	
2006	4.482		2006	3.880		2006	0.601		2006	0.0171		2006	0.0182		2006	0.0123	
2007	4.987		2007	4.341		2007	0.645		2007	0.0187		2007	0.0200		2007	0.0133	
2008	3.134	-37.2%	2008	2.686	-38.1%	2008	0.448	-30.5%	2008	0.0122	-35.1%	2008	0.0128	-35.8%	2008	0.0092	-30.6%
2009	1.526	-69.4%	2009	1.295	-70.2%	2009	0.232	-64.1%	2009	0.0063	-66.3%	2009	0.0067	-66.7%	2009	0.0048	-63.6%
2010	1.422	-71.5%	2010	1.210	-72.1%	2010	0.212	-67.2%	2010	0.0060	-68.1%	2010	0.0063	-68.4%	2010	0.0046	-65.8%
2011	2.191	-56.1%	2011	1.911	-56.0%	2011	0.281	-56.5%	2011	0.0088	-52.8%	2011	0.0095	-52.6%	2011	0.0061	-54.2%
2012	2.183	-56.2%	2012	1.913	-55.9%	2012	0.270	-58.2%	2012	0.0082	-56.0%	2012	0.0088	-55.9%	2012	0.0056	-57.6%
2013	2.314	-53.6%	2013	2.044	-52.9%	2013	0.271	-58.1%	2013	0.0086	-54.3%	2013	0.0092	-53.9%	2013	0.0055	-58.7%
2014	2.494	-50.0%	2014	2.237	-48.5%	2014	0.257	-60.2%	2014	0.0091	-51.6%	2014	0.0097	-51.3%	2014	0.0056	-57.6%
2015	3.015	-39.5%	2015	2.722	-37.3%	2015	0.293	-54.6%	2015	0.0107	-43.1%	2015	0.0115	-42.4%	2015	0.0064	-52.0%
2016	3.009	-39.7%	2016	2.716	-37.4%	2016	0.293	-54.6%	2016	0.0106	-43.6%	2016	0.0114	-43.0%	2016	0.0065	-51.5%

Table 7: Descriptive Statistics for Regression Dependent Variables and Control Variables
This table presents descriptive statistics for control variables that appear in regression models to explain small-business-loan originations in urban and rural areas. Amounts and numbers are shown for three size buckets of loans: less than $100,000, $100,000 to $250,000, and $250,000 to $1 million, as well as for the total of these three size buckets Also shown are amounts and numbers for loan originations to firms with revenues less than $1 Million. *Population* is the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Control variables are measured at the Census Tract one year prior to the reported dependent variable. Amounts are the author's calculations based upon Census-tract-level data downloaded from the website of the U.S. Federal Financial Institution Examination Council (FFIEC) at www.ffiec.gov.

	All			Urban			Rural				
Variable	**Obs.**	**Mean**	**Std. Error**	**Obs.**	**Mean**	**Std. Error**	**Obs.**	**Mean**	**Std. Error**	**Difference**	**T-Stat**
Dependent Variables											
Amount < $100K	1,359,875	1,130.40	1.37	1,089,805	1,210.72	1.64	270,070	806.28	1.79	404.45	235.93
Amount $100K-$250K	1,359,875	557.95	0.84	1,089,805	588.21	0.99	270,070	435.81	1.33	152.40	133.05
Amount $250K-$1M	1,359,875	1,645.38	2.84	1,089,805	1,812.48	3.43	270,070	971.08	3.36	841.40	247.96
Amount Rev. < $1M	1,359,875	1,383.08	1.74	1,089,805	1,436.59	2.00	270,070	1,167.17	3.46	269.42	102.45
Amount < $1M	1,359,875	3,333.73	4.68	1,089,805	3,611.41	5.63	270,070	2,213.17	5.90	1398.24	242.73
Number < $100K	1,359,875	86.34	0.10	1,089,805	93.29	0.12	270,070	58.29	0.12	35.01	289.10
Number $100K-$250K	1,359,875	3.19	0.00	1,089,805	3.34	0.01	270,070	2.57	0.01	0.77	116.62
Number $250K-$1M	1,359,875	3.09	0.01	1,089,805	3.39	0.01	270,070	1.91	0.01	1.47	233.26
Number Rev. < $1M	1,359,875	38.77	0.04	1,089,805	40.83	0.05	270,070	30.44	0.07	10.39	187.28
Number < $1M	1,359,875	92.62	0.10	1,089,805	100.02	0.13	270,070	62.77	0.13	37.24	287.64
Control Variables											
Population	1,359,875	4,264.28	1.83	1,089,805	4,372.48	2.12	270,070	3,827.64	3.32	544.85	205.30
Median Family Income	1,359,875	100.35	0.03	1,089,805	100.66	0.04	270,070	99.10	0.04	1.56	36.74
Median Age	1,359,875	35.60	0.01	1,089,805	35.23	0.01	270,070	37.08	0.01	-1.85	-217.17
Employment-Population Ratio	1,358,347	59.27	0.01	1,088,398	60.17	0.01	269,949	55.67	0.02	4.50	319.53
Labor Force Participation Rate	1,358,347	63.66	0.01	1,088,398	64.62	0.01	269,949	59.79	0.02	4.83	367.62

Table 8: Regression Models of the Amount of Small-Business Loan Originations in Amounts < $1 Million

Results are from a series of four OLS fixed-effects models where the dependent variable is the natural logarithm of the annual amount of bank small-business loan originations in amounts less than $1 Million by Census tract during 1996-2016. Small-business loans are defined as the sum of commercial & industrial loans and commercial real estate loans. The analysis is based upon 1.3 million tract-year observations from 1996 – 2016 gathered from the annual FFIEC Community Reinvestment Act (CRA) Reports on bank lending to small-businesses. Each panel includes a set of control variables measured at the Census Tract one year prior to the reported dependent variable. *log(Loan Amount)* is the natural logarithm of amount of originations in the previous year. *log(Population)* is the natural logarithm of the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Panels 1and 2 include a set of Year fixed-effect variables, with 2007 being the omitted year. Rural is an indicator for rural Census Tracts. *Rural x Financial Crisis* is an indicator for rural Census Tracts during the financial crisis years 2008 2010. *Rural x Post Crisis* is an indicator for rural Census Tracts during post-crisis years 2011-2016. *R2008 R2016* are interaction terms where Rural is multiplied by Year fixed-effects variables for 2008 2016. Panels 1 and 2 include a set of state fixed effects. Panels 3 and 4 replace the state and year fixed effects with a set of State x Year fixed effects. *t*-statistics are based upon robust standard errors.

	Panel 1		Panel 2		Panel 3		Panel 4	
Variables	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**
Census Tract Controls (Lagged One Year)								
log(Loan Amount)	0.803	1,596.0	0.803	1,596.0	0.803	1,596.0	0.803	1,596.0
log(Population)	0.116	95.310	0.116	95.30	0.115	95.25	0.115	95.25
Median Family Income, % of MSA	0.001	65.320	0.001	65.27	0.001	64.61	0.001	64.61
Employment-Population Ratio	0.009	36.290	0.009	36.39	0.009	36.98	0.009	36.99
Labor-Force Participation Rate	-0.006	-25.470	-0.006	-25.58	-0.006	-26.02	-0.006	-26.02
Year Fixed Effects								
y1997	-0.152	-36.43	-0.152	-36.45	n/a		n/a	
y1998	-0.209	-49.78	-0.209	-49.80	n/a		n/a	
y1999	-0.068	-16.22	-0.068	-16.24	n/a		n/a	
y2000	-0.135	-32.33	-0.135	-32.35	n/a		n/a	
y2001	0.022	5.16	0.021	5.13	n/a		n/a	
y2002	0.016	3.88	0.016	3.85	n/a		n/a	
y2003	-0.023	-5.29	-0.023	-5.32	n/a		n/a	
y2004	-0.050	-12.24	-0.050	-12.24	n/a		n/a	
y2005	-0.170	-41.85	-0.170	-41.85	n/a		n/a	
y2006	0.040	9.89	0.040	9.89	n/a		n/a	
y2007					n/a		n/a	
y2008	-0.271	-66.88	-0.273	-65.82	n/a		n/a	
y2009	-0.674	-166.10	-0.676	-162.80	n/a		n/a	
y2010	-0.341	-83.62	-0.343	-82.21	n/a		n/a	
y2011	-0.095	-23.26	-0.092	-22.28	n/a		n/a	
y2012	-0.202	-46.57	-0.199	-45.56	n/a		n/a	
y2013	-0.190	-47.65	-0.187	-46.31	n/a		n/a	
y2014	-0.172	-43.10	-0.169	-41.91	n/a		n/a	
y2015	-0.126	-31.65	-0.124	-30.62	n/a		n/a	
y2016	-0.132	-33.29	-0.130	-32.23	n/a		n/a	
Rural Variables								
Rural	-0.073	-39.76	-0.070	-30.18	-0.069	-28.80	-0.069	-28.80
Rural x Financial Crisis (2008-2010)			0.011	2.33	-0.020	-3.92		
Rural x Post Crisis (2011-2016)			-0.014	-3.80	-0.008	-1.89		
r2008							0.010	1.17
r2009							-0.048	-5.84
r2010							-0.022	-2.67
r2011							0.009	1.10
r2012							-0.019	-1.95
r2013							-0.030	-3.74
r2014							0.018	2.24
r2015							-0.016	-1.97
r2016							-0.010	-1.24
Constant	0.437	41.63	0.437	41.61	0.289	28.67	0.289	28.67
State Fixed Effects	**Yes (Absorbed)**		**Yes (Absorbed)**		No		No	
State x Year Fixed Effects	No		No		**Yes (Absorbed)**		**Yes (Absorbed)**	
Observations	1,277,401		1,277,401		1,277,401		1,277,401	
R-squared	0.739		0.744		0.747		0.747	

Table 9: Regression Models of the Amount of Small-Business Loan Originations in Amounts < $100,000

Results are from a series of four OLS fixed-effects models where the dependent variable is the natural logarithm of the annual amount of bank small-business loan originations in amounts less than $100,000 by Census tract during 1996-2016. Small-business loans are defined as the sum of commercial & industrial loans and commercial real estate loans. The analysis is based upon 1.3 million tract-year observations from 1996 – 2016 gathered from the annual FFIEC Community Reinvestment Act (CRA) Reports on bank lending to small-businesses. Each panel includes a set of control variables measured at the Census Tract one year prior to the reported dependent variable. *log(Loan Amount)* is the natural logarithm of amount of originations in the previous year. *log(Population)* is the natural logarithm of the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Panels 1and 2 include a set of Year fixed-effect variables, with 2007 being the omitted year. Rural is an indicator for rural Census Tracts. *Rural x Financial Crisis* is an indicator for rural Census Tracts during the financial crisis years 2008 2010. *Rural x Post Crisis* is an indicator for rural Census Tracts during post-crisis years 2011-2016. *R2008 R2016* are interaction terms where Rural is multiplied by Year fixed-effects variables for 2008 2016. Panels 1 and 2 include a set of state fixed effects. Panels 3 and 4 replace the state and year fixed effects with a set of State x Year fixed effects. *t*-statistics are based upon robust standard errors.

	Panel 1		Panel 2		Panel 3		Panel 4	
Variables	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**
Census Tract Controls (Lagged One Year)								
log(Loan Amount)	0.833	1,822.00	0.833	1,822.00	0.834	1,820.00	0.834	1,820.00
log(Population)	0.097	110.500	0.097	110.50	0.097	111.30	0.097	111.30
Median Family Income, % of MSA	0.001	80.200	0.001	80.08	0.001	78.70	0.001	78.69
Employment-Population Ratio	0.008	48.610	0.008	48.98	0.009	51.03	0.009	51.09
Labor-Force Participation Rate	-0.006	-34.390	-0.006	-34.80	-0.006	-36.47	-0.006	-36.54
Year Fixed Effects								
y1997	-0.210	-70.14	-0.210	-70.25	n/a		n/a	
y1998	-0.303	-101.60	-0.304	-101.70	n/a		n/a	
y1999	-0.131	-43.79	-0.131	-43.89	n/a		n/a	
y2000	-0.033	-11.03	-0.033	-11.14	n/a		n/a	
y2001	-0.155	-52.49	-0.155	-52.59	n/a		n/a	
y2002	-0.027	-9.01	-0.027	-9.11	n/a		n/a	
y2003	-0.134	-43.72	-0.135	-43.83	n/a		n/a	
y2004	-0.103	-35.78	-0.103	-35.79	n/a		n/a	
y2005	-0.137	-47.64	-0.137	-47.65	n/a		n/a	
y2006	0.096	33.54	0.096	33.54	n/a		n/a	
y2007								
y2008	-0.391	-136.40	-0.395	-134.60	n/a		n/a	
y2009	-0.874	-304.40	-0.878	-298.80	n/a		n/a	
y2010	-0.399	-137.60	-0.403	-135.90	n/a		n/a	
y2011	-0.110	-37.76	-0.103	-35.12	n/a		n/a	
y2012	-0.292	-95.02	-0.287	-92.33	n/a		n/a	
y2013	-0.262	-92.56	-0.256	-89.14	n/a		n/a	
y2014	-0.154	-54.41	-0.148	-51.70	n/a		n/a	
y2015	-0.135	-47.63	-0.129	-45.00	n/a		n/a	
y2016	-0.165	-58.43	-0.159	-55.65	n/a		n/a	
Rural Variables								
Rural	-0.033	-25.41	-0.026	-16.01	-0.025	-14.65	-0.025	-14.66
Rural x Financial Crisis (2008-2010)			0.022	6.43	-0.007	-1.95		
Rural x Post Crisis (2011-2016)			-0.034	-12.75	-0.028	-9.73		
r2008							0.004	0.75
r2009							-0.006	-1.06
r2010							-0.019	-3.34
r2011							-0.006	-1.00
r2012							-0.020	-2.91
r2013							-0.051	-9.09
r2014							-0.031	-5.33
r2015							-0.028	-4.80
r2016							-0.027	-4.62
Constant	0.295	39.92	0.295	39.87	0.098	13.84	0.098	13.88
State Fixed Effects	No		No		**Yes (Absorbed)**		No	
State x Year Fixed Effects	No		No		No		**Yes (Absorbed)**	
Observations	1,277,219		1,277,219		1,277,219		1,277,219	
R-squared	0.814		0.820		0.821		0.825	

Table 10: Regression Models of the Amount of Small-Business Loan Originations in Amounts $250,000 $1 Million

Results are from a series of four OLS fixed-effects models where the dependent variable is the natural logarithm of the annual amount of bank small-business loan originations in amounts of $250,000 $1 Million by Census tract during 1996-2016. Small-business loans are defined as the sum of commercial & industrial loans and commercial real estate loans. The analysis is based upon 1.3 million tract-year observations from 1996 – 2016 gathered from the annual FFIEC Community Reinvestment Act (CRA) Reports on bank lending to small-businesses. Each panel includes a set of control variables measured at the Census Tract one year prior to the reported dependent variable. *log(Loan Amount)* is the natural logarithm of amount of originations in the previous year. *log(Population)* is the natural logarithm of the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Panels 1and 2 include a set of Year fixed-effect variables, with 2007 being the omitted year. Rural is an indicator for rural Census Tracts. *Rural x Financial Crisis* is an indicator for rural Census Tracts during the financial crisis years 2008 2010. *Rural x Post Crisis* is an indicator for rural Census Tracts during post-crisis years 2011-2016. *R2008 R2016* are interaction terms where Rural is multiplied by Year fixed-effects variables for 2008 2016. Panels 1 and 2 include a set of state fixed effects. Panels 3 and 4 replace the state and year fixed effects with a set of State x Year fixed effects. *t*-statistics are based upon robust standard errors.

	Panel 1		Panel 2		Panel 3		Panel 4	
Variables	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**
Census Tract Controls (Lagged One Year)								
log(Loan Amount)	0.547	739.20	0.547	739.20	0.546	391.40	0.546	391.40
log(Population)	0.420	92.740	0.420	92.69	0.417	45.58	0.417	45.59
Median Family Income, % of MSA	0.005	66.840	0.005	66.92	0.005	47.61	0.005	47.62
Employment-Population Ratio	0.021	23.410	0.021	23.30	0.020	12.56	0.020	12.54
Labor-Force Participation Rate	-0.015	-16.420	-0.015	-16.32	-0.015	-8.69	-0.015	-8.67
Year Fixed Effects								
y1997	-0.341	-21.54	-0.340	-21.45	n/a		n/a	
y1998	-0.346	-21.76	-0.345	-21.67	n/a		n/a	
y1999	-0.134	-8.40	-0.132	-8.32	n/a		n/a	
y2000	-0.465	-29.29	-0.464	-29.21	n/a		n/a	
y2001	0.227	14.32	0.228	14.40	n/a		n/a	
y2002	0.143	9.02	0.144	9.10	n/a		n/a	
y2003	0.240	14.51	0.241	14.60	n/a		n/a	
y2004	0.119	7.72	0.119	7.72	n/a		n/a	
y2005	-0.251	-16.22	-0.251	-16.22	n/a		n/a	
y2006	-0.045	-2.88	-0.045	-2.88	n/a		n/a	
y2007					n/a		n/a	
y2008	-0.152	-9.83	-0.167	-10.58	n/a		n/a	
y2009	-0.660	-42.66	-0.675	-42.65	n/a		n/a	
y2010	-0.509	-32.89	-0.525	-33.10	n/a		n/a	
y2011	-0.258	-16.63	-0.268	-17.07	n/a		n/a	
y2012	-0.225	-13.65	-0.234	-14.11	n/a		n/a	
y2013	-0.270	-17.83	-0.281	-18.26	n/a		n/a	
y2014	-0.405	-26.77	-0.416	-27.08	n/a		n/a	
y2015	-0.320	-21.13	-0.330	-21.51	n/a		n/a	
y2016	-0.262	-17.33	-0.273	-17.76	n/a		n/a	
Rural Variables								
Rural	-0.470	-67.34	-0.499	-56.10	-0.499	-44.20	-0.499	-44.21
Rural x Financial Crisis (2008-2010)			0.083	4.57	0.037	2.44		
Rural x Post Crisis (2011-2016)			0.058	4.01	0.057	4.29		
r2008							0.073	2.49
r2009							0.006	0.20
r2010							0.032	1.08
r2011							0.028	0.95
r2012							0.008	0.22
r2013							0.056	1.87
r2014							0.131	4.23
r2015							0.075	2.41
r2016							0.028	0.90
Constant	-1.718	-42.98	-1.711	-42.79	-1.893	-24.71	-1.894	-24.72
State Fixed Effects	**Yes (Absorbed)**		**Yes (Absorbed)**		**No**		**No**	
State x Year Fixed Effects	No		No		**Yes (Absorbed)**		**Yes (Absorbed)**	
Observations	1,277,440		1,277,440		1,277,440		1,277,440	
R-squared	0.37		0.370		0.373		0.373	

Table 11: Regression Models of the Amount of Small-Business Loan Originations to Firms with Revenues < $1 Million

Results are from a series of four OLS fixed-effects models where the dependent variable is the natural logarithm of the annual amount of bank small-business loan originations to firms with revenues less than $1 million by Census tract during 1996-2016. Small-business loans are defined as the sum of commercial & industrial loans and commercial real estate loans. The analysis is based upon 1.3 million tract-year observations from 1996 – 2016 gathered from the annual FFIEC Community Reinvestment Act (CRA) Reports on bank lending to small-businesses. Each panel includes a set of control variables measured at the Census Tract one year prior to the reported dependent variable. *log(Loan Amount)* is the natural logarithm of amount of originations in the previous year. *log(Population)* is the natural logarithm of the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Panels 1and 2 include a set of Year fixed-effect variables, with 2007 being the omitted year. Rural is an indicator for rural Census Tracts. *Rural x Financial Crisis* is an indicator for rural Census Tracts during the financial crisis years 2008 2010. *Rural x Post Crisis* is an indicator for rural Census Tracts during post-crisis years 2011-2016. *R2008 R2016* are interaction terms where Rural is multiplied by Year fixed-effects variables for 2008 2016. Panels 1 and 2 include a set of state fixed effects. Panels 3 and 4 replace the state and year fixed effects with a set of State x Year fixed effects. *t*-statistics are based upon robust standard errors.

	Panel 1		Panel 2		Panel 3		Panel 4	
Variables	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**
Census Tract Controls (Lagged One Year)								
log(Loan Amount)	0.691	1,115.00	0.691	1,115.00	0.689	1,108.00	0.689	1,108.00
log(Population)	0.220	139.100	0.220	139.20	0.222	140.70	0.222	140.70
Median Family Income, % of MSA	0.002	93.370	0.002	93.24	0.002	92.73	0.002	92.74
Employment-Population Ratio	0.017	56.150	0.017	56.49	0.018	58.09	0.018	58.07
Labor-Force Participation Rate	-0.013	-40.810	-0.013	-41.18	-0.014	-42.33	-0.014	-42.30
Year Fixed Effects								
y1997	-0.245	-45.33	-0.246	-45.45				
y1998	-0.124	-22.89	-0.125	-23.01				
y1999	-0.033	-6.05	-0.033	-6.17				
y2000	-0.188	-34.89	-0.189	-35.01				
y2001	0.011	2.04	0.010	1.93				
y2002	-0.051	-9.42	-0.051	-9.53				
y2003	0.093	16.61	0.092	16.48				
y2004	-0.041	-7.72	-0.041	-7.72				
y2005	-0.054	-10.19	-0.054	-10.20				
y2006	0.062	11.90	0.062	11.90				
y2007								
y2008	-0.392	-74.76	-0.396	-73.78				
y2009	-0.726	-138.30	-0.730	-135.90				
y2010	-0.445	-84.21	-0.449	-83.08				
y2011	-0.129	-24.38	-0.118	-22.02				
y2012	-0.306	-54.62	-0.296	-52.39				
y2013	-0.252	-48.89	-0.242	-46.16				
y2014	-0.246	-47.63	-0.236	-45.08				
y2015	-0.124	-23.97	-0.114	-21.73				
y2016	-0.204	-39.66	-0.194	-37.21				
Rural Variables								
Rural	-0.078	-33.24	-0.065	-21.59	-0.070	-22.44	-0.070	-22.44
Rural x Financial Crisis (2008-2010)			0.022	3.55	-0.014	-2.15		
Rural x Post Crisis (2011-2016)			-0.059	-12.04	-0.033	-6.37		
r2008							0.006	0.57
r2009							-0.029	-2.68
r2010							-0.020	-1.91
r2011							-0.022	-2.07
r2012							-0.067	-5.35
r2013							-0.029	-2.77
r2014							-0.022	-2.03
r2015							-0.023	-2.19
r2016							-0.048	-4.50
Constant	-0.060	-4.41	-0.061	-4.51	-0.239	-18.33	-0.239	-18.35
State Fixed Effects	**Yes (Absorbed)**		**Yes (Absorbed)**		No		No	
State x Year Fixed Effects	No		No		**Yes (Absorbed)**		**Yes (Absorbed)**	
Observations	1,277,440		1,277,440		1,277,440		1,277,440	
R-squared	0.631		0.631		0.636		0.636	

Table 12: Regression Models of the Number of Small-Business Loan Originations in Amounts < $1 Million

Results are from a series of four OLS fixed-effects models where the dependent variable is the natural logarithm of the annual number of bank small-business loan originations in amounts less than $1 Million by Census tract during 1996-2016. Small-business loans are defined as the sum of commercial & industrial loans and commercial real estate loans. The analysis is based upon 1.3 million tract-year observations from 1996 – 2016 gathered from the annual FFIEC Community Reinvestment Act (CRA) Reports on bank lending to small-businesses. Each panel includes a set of control variables measured at the Census Tract one year prior to the reported dependent variable. *log(Loan Amount)* is the natural logarithm of amount of originations in the previous year. *log(Population)* is the natural logarithm of the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Panels 1and 2 include a set of Year fixed-effect variables, with 2007 being the omitted year. Rural is an indicator for rural Census Tracts. *Rural x Financial Crisis* is an indicator for rural Census Tracts during the financial crisis years 2008 2010. *Rural x Post Crisis* is an indicator for rural Census Tracts during post-crisis years 2011-2016. *R2008 R2016* are interaction terms where Rural is multiplied by Year fixed-effects variables for 2008 2016. Panels 1 and 2 include a set of state fixed effects. Panels 3 and 4 replace the state and year fixed effects with a set of State x Year fixed effects. *t*-statistics are based upon robust standard errors.

	Panel 1		Panel 2		Panel 3		Panel 4	
Variables	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**
Census Tract Controls (Lagged One Year)								
log(Number of Loans)	0.900	2,530.00	0.900	2,529.00	0.903	2,564.00	0.903	2,565.00
log(Population)	0.057	108.800	0.057	108.90	0.055	107.40	0.055	107.40
Median Family Income, % of MSA	0.001	72.480	0.001	72.38	0.001	70.43	0.001	70.39
Employment-Population Ratio	0.004	40.140	0.004	40.49	0.004	41.62	0.004	41.79
Labor-Force Participation Rate	-0.003	-24.730	-0.003	-25.13	-0.003	-26.11	-0.003	-26.32
Year Fixed Effects								
y1997	-0.165	-91.60	-0.166	-91.73	n/a		n/a	
y1998	-0.196	-108.50	-0.196	-108.60	n/a		n/a	
y1999	0.058	32.16	0.058	32.01	n/a		n/a	
y2000	0.247	139.00	0.246	138.80	n/a		n/a	
y2001	0.013	7.41	0.013	7.29	n/a		n/a	
y2002	0.066	38.25	0.066	38.13	n/a		n/a	
y2003	-0.061	-33.68	-0.061	-33.80	n/a		n/a	
y2004	-0.085	-50.58	-0.085	-50.60	n/a		n/a	
y2005	-0.123	-73.13	-0.123	-73.16	n/a		n/a	
y2006	0.303	179.80	0.303	179.80	n/a		n/a	
y2007					n/a		n/a	
y2008	-0.340	-203.00	-0.342	-199.30	n/a		n/a	
y2009	-0.923	-549.90	-0.925	-538.40	n/a		n/a	
y2010	-0.292	-170.20	-0.294	-167.70	n/a		n/a	
y2011	-0.004	-2.24	0.000	-0.26	n/a		n/a	
y2012	-0.146	-80.56	-0.143	-78.19	n/a		n/a	
y2013	-0.215	-128.40	-0.212	-124.70	n/a		n/a	
y2014	-0.065	-38.95	-0.062	-36.63	n/a		n/a	
y2015	-0.087	-51.73	-0.083	-49.22	n/a		n/a	
y2016	-0.107	-64.25	-0.104	-61.58	n/a		n/a	
Rural Variables								
Rural	-0.025	-32.68	-0.021	-21.62	-0.016	-16.56	-0.016	-16.59
Rural x Financial Crisis (2008-2010)			0.010	4.94	-0.015	-6.92		
Rural x Post Crisis (2011-2016)			-0.019	-12.06	-0.020	-12.40		
r2008							0.001	0.23
r2009							-0.029	-8.68
r2010							-0.015	-4.49
r2011							-0.016	-4.71
r2012							0.035	8.76
r2013							-0.061	-18.86
r2014							-0.014	-4.09
r2015							-0.034	-10.14
r2016							-0.013	-3.88
Constant	-0.047	-10.72	-0.047	-10.80	-0.151	-36.46	-0.150	-36.32
State Fixed Effects	No		No		**Yes (Absorbed)**		No	
State x Year Fixed Effects	No		No		No		**Yes (Absorbed)**	
Observations	1,277,401		1,277,401		1,277,401		1,277,401	
R-squared	0.916		0.916		0.920		0.920	

Table 13: Regression Models of the Number of Small-Business Loan Originations in Amounts < $100,000

Results are from a series of four OLS fixed-effects models where the dependent variable is the natural logarithm of the annual number of bank small-business loan originations in amounts less than $100,000 by Census tract during 1996-2016. Small-business loans are defined as the sum of commercial & industrial loans and commercial real estate loans. The analysis is based upon 1.3 million tract-year observations from 1996 – 2016 gathered from the annual FFIEC Community Reinvestment Act (CRA) Reports on bank lending to small-businesses. Each panel includes a set of control variables measured at the Census Tract one year prior to the reported dependent variable. *log(Loan Amount)* is the natural logarithm of amount of originations in the previous year. *log(Population)* is the natural logarithm of the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Panels 1and 2 include a set of Year fixed-effect variables, with 2007 being the omitted year. Rural is an indicator for rural Census Tracts. *Rural x Financial Crisis* is an indicator for rural Census Tracts during the financial crisis years 2008 2010. *Rural x Post Crisis* is an indicator for rural Census Tracts during post-crisis years 2011-2016. *R2008 R2016* are interaction terms where Rural is multiplied by Year fixed-effects variables for 2008 2016. Panels 1 and 2 include a set of state fixed effects. Panels 3 and 4 replace the state and year fixed effects with a set of State x Year fixed effects. *t*-statistics are based upon robust standard errors.

	Panel 1		**Panel 2**		**Panel 3**		**Panel 4**	
VARIABLES	Coef.	t-Statistic	Coef.	t-Statistic	Coef.	t-Statistic	Coef.	t-Statistic
Census Tract Controls (Lagged One Year)								
log(Number of Loans)	0.892	2,399.00	0.892	2,397.00	0.895	2,428.00	0.895	2,428.00
log(Population)	0.063	115.900	0.063	116.00	0.061	114.50	0.061	114.40
Median Family Income, % of MSA	0.001	77.040	0.001	76.95	0.001	74.90	0.001	74.85
Employment-Population Ratio	0.004	42.930	0.004	43.32	0.004	44.51	0.004	44.67
Labor-Force Participation Rate	-0.003	-26.690	-0.003	-27.12	-0.003	-28.12	-0.003	-28.34
Year Fixed Effects								
y1997	-0.193	-103.70	-0.194	-103.80	n/a		n/a	
y1998	-0.222	-119.10	-0.222	-119.30	n/a		n/a	
y1999	0.050	26.62	0.049	26.43	n/a		n/a	
y2000	0.272	149.10	0.272	148.80	n/a		n/a	
y2001	-0.006	-3.41	-0.006	-3.56	n/a		n/a	
y2002	0.062	34.92	0.062	34.77	n/a		n/a	
y2003	-0.072	-39.12	-0.072	-39.27	n/a		n/a	
y2004	-0.094	-54.17	-0.094	-54.21	n/a		n/a	
y2005	-0.123	-71.39	-0.123	-71.42	n/a		n/a	
y2006	0.313	181.40	0.313	181.40	n/a		n/a	
y2007					n/a		n/a	
y2008	-0.349	-203.50	-0.351	-199.70	n/a		n/a	
y2009	-0.958	-557.30	-0.960	-545.60	n/a		n/a	
y2010	-0.309	-175.20	-0.311	-172.50	n/a		n/a	
y2011	-0.012	-6.97	-0.009	-4.81	n/a		n/a	
y2012	-0.160	-85.80	-0.157	-83.29	n/a		n/a	
y2013	-0.234	-135.90	-0.230	-132.00	n/a		n/a	
y2014	-0.071	-41.19	-0.068	-38.73	n/a		n/a	
y2015	-0.096	-56.05	-0.093	-53.38	n/a		n/a	
y2016	-0.118	-68.79	-0.114	-65.95	n/a		n/a	
Rural Variables								
Rural	-0.026	-33.07	-0.021	-21.38	-0.017	-17.06	-0.017	-17.09
Rural x Financial Crisis (2008-2010)			0.009	4.58	-0.011	-5.30		
Rural x Post Crisis (2011-2016)			-0.021	-12.97	-0.022	-12.89		
r2008							0.001	0.33
r2009							-0.022	-6.25
r2010							-0.014	-3.99
r2011							-0.019	-5.37
r2012							0.037	9.16
r2013							-0.063	-18.85
r2014							-0.018	-5.14
r2015							-0.035	-10.16
r2016							-0.013	-3.86
Constant	-0.066	-14.76	-0.066	-14.86	-0.179	-42.18	-0.178	-42.03
State Fixed Effects	**Yes (Absorbed)**		**Yes (Absorbed)**		No		No	
State x Year Fixed Effects	No		No		**Yes (Absorbed)**		**Yes (Absorbed)**	
Observations	1,273,750		1,273,750		1,273,750		1,273,750	
R-squared	0.901		0.904		0.909		0.909	

Table 14: Regression Models of the Number of Small-Business Loan Originations in Amounts $250,000 $1 Million

Results are from a series of four OLS fixed-effects models where the dependent variable is the natural logarithm of the annual number of bank small-business loan originations in amounts of $250,000 $1 Million by Census tract during 1996-2016. Small-business loans are defined as the sum of commercial & industrial loans and commercial real estate loans. The analysis is based upon 1.3 million tract-year observations from 1996 – 2016 gathered from the annual FFIEC Community Reinvestment Act (CRA) Reports on bank lending to small-businesses. Each panel includes a set of control variables measured at the Census Tract one year prior to the reported dependent variable. *log(Loan Amount)* is the natural logarithm of amount of originations in the previous year. *log(Population)* is the natural logarithm of the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Panels 1and 2 include a set of Year fixed-effect variables, with 2007 being the omitted year. Rural is an indicator for rural Census Tracts. *Rural x Financial Crisis* is an indicator for rural Census Tracts during the financial crisis years 2008 2010. *Rural x Post Crisis* is an indicator for rural Census Tracts during post-crisis years 2011-2016. *R2008 R2016* are interaction terms where Rural is multiplied by Year fixed-effects variables for 2008 2016. Panels 1 and 2 include a set of state fixed effects. Panels 3 and 4 replace the state and year fixed effects with a set of State x Year fixed effects. *t*-statistics are based upon robust standard errors.

	Panel 1		Panel 2		Panel 3		Panel 4	
Variables	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**
Census Tract Controls (Lagged One Year)								
log(Number of Loans)	0.753	1,284.00	0.753	1,284.00	0.753	1,283.00	0.753	1,283.00
log(Population)	0.056	62.530	0.056	62.44	0.055	61.98	0.055	61.99
Median Family Income, % of MSA	0.001	55.200	0.001	55.32	0.001	55.91	0.001	55.92
Employment-Population Ratio	0.003	15.490	0.003	15.38	0.003	14.38	0.003	14.35
Labor-Force Participation Rate	-0.002	-10.190	-0.002	-10.12	-0.002	-9.23	-0.002	-9.19
Year Fixed Effects								
y1997	-0.038	-12.05	-0.037	-11.90	n/a		n/a	
y1998	-0.057	-18.33	-0.057	-18.19	n/a		n/a	
y1999	-0.012	-3.90	-0.012	-3.77	n/a		n/a	
y2000	-0.104	-33.42	-0.104	-33.28	n/a		n/a	
y2001	0.113	36.12	0.113	36.25	n/a		n/a	
y2002	0.046	14.78	0.046	14.92	n/a		n/a	
y2003	0.063	19.52	0.064	19.67	n/a		n/a	
y2004	0.019	6.08	0.019	6.09	n/a		n/a	
y2005	-0.092	-30.33	-0.092	-30.33	n/a		n/a	
y2006	-0.016	-5.33	-0.016	-5.33	n/a		n/a	
y2007					n/a		n/a	
y2008	-0.052	-17.03	-0.059	-18.91	n/a		n/a	
y2009	-0.193	-63.57	-0.200	-64.38	n/a		n/a	
y2010	-0.113	-37.08	-0.120	-38.50	n/a		n/a	
y2011	-0.034	-11.06	-0.036	-11.65	n/a		n/a	
y2012	-0.036	-11.26	-0.039	-11.83	n/a		n/a	
y2013	-0.051	-17.25	-0.054	-17.77	n/a		n/a	
y2014	-0.090	-30.39	-0.093	-30.74	n/a		n/a	
y2015	-0.059	-19.90	-0.062	-20.39	n/a		n/a	
y2016	-0.051	-17.21	-0.054	-17.73	n/a		n/a	
Rural Variables								
Rural	-0.079	-57.35	-0.088	-50.36	-0.090	-49.66	-0.090	-49.66
Rural x Financial Crisis (2008-2010)			0.038	10.62	0.031	7.97		
Rural x Post Crisis (2011-2016)			0.013	4.45	0.017	5.61		
r2008							0.027	4.43
r2009							0.039	6.34
r2010							0.026	4.12
r2011							0.009	1.51
r2012							0.010	1.34
r2013							0.023	3.88
r2014							0.038	6.24
r2015							0.015	2.36
r2016							0.004	0.67
Constant	-0.283	-36.07	-0.281	-35.74	-0.320	-42.19	-0.320	-42.21
State Fixed Effects	**Yes (Absorbed)**		**Yes (Absorbed)**		**No**		No	
State x Year Fixed Effects	No		No		**Yes (Absorbed)**		**Yes (Absorbed)**	
Observations	1,277,401		1,277,401		1,277,401		1,277,401	
R-squared	0.610		0.613		0.617		0.617	

Table 15: Regression Models of the Number of Small-Business Loan Originations to Firms with Revenues < $1 Million

Results are from a series of four OLS fixed-effects models where the dependent variable is the natural logarithm of the annual number of bank small-business loan originations to firms with revenues less than $1 million by Census tract during 1996-2016. Small-business loans are defined as the sum of commercial & industrial loans and commercial real estate loans. The analysis is based upon 1.3 million tract-year observations from 1996 – 2016 gathered from the annual FFIEC Community Reinvestment Act (CRA) Reports on bank lending to small-businesses. Each panel includes a set of control variables measured at the Census Tract one year prior to the reported dependent variable. *log(Loan Amount)* is the natural logarithm of amount of originations in the previous year. *log(Population)* is the natural logarithm of the population in the Census tract. *Median Family Income, % of MSA* is the median family income in the Census tract expressed as a percentage of median family income in the MSA in which the tract is located, or, for rural tracts, in the rural areas of the state in which the tract is located. *Employment-Population Ratio* is the ratio of employed persons to the population in the Census tract. *Labor Force Participation Rate* is the ratio of persons employed and unemployed to the population in the Census tract. Panels 1and 2 include a set of Year fixed-effect variables, with 2007 being the omitted year. Rural is an indicator for rural Census Tracts. *Rural x Financial Crisis* is an indicator for rural Census Tracts during the financial crisis years 2008 2010. *Rural x Post Crisis* is an indicator for rural Census Tracts during post-crisis years 2011-2016. *R2008 R2016* are interaction terms where Rural is multiplied by Year fixed-effects variables for 2008 2016. Panels 1 and 2 include a set of state fixed effects. Panels 3 and 4 replace the state and year fixed effects with a set of State x Year fixed effects. *t*-statistics are based upon robust standard errors.

	Panel 1		Panel 2		Panel 3		Panel 4	
Variables	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**	**Coef.**	**t-Statistic**
Census Tract Controls (Lagged One Year)								
log(Number of Loans)	0.846	1,885.0	0.845	1,881.0	0.846	1,886.0	0.846	1,886.0
log(Population)	0.089	131.90	0.089	132.60	0.089	134.30	0.089	134.20
Median Family Income, % of MSA	0.001	85.21	0.001	85.24	0.001	83.97	0.001	83.97
Employment-Population Ratio	0.006	48.69	0.006	49.85	0.007	52.62	0.007	52.53
Labor-Force Participation Rate	-0.004	-31.24	-0.004	-32.47	-0.004	-34.77	-0.004	-34.69
Year Fixed Effects								
y1997	-0.320	-141.60	-0.322	-142.30	n/a		n/a	
y1998	-0.097	-42.63	-0.098	-43.23	n/a		n/a	
y1999	0.007	3.05	0.006	2.52	n/a		n/a	
y2000	-0.114	-51.12	-0.115	-51.60	n/a		n/a	
y2001	-0.033	-14.98	-0.034	-15.41	n/a		n/a	
y2002	-0.282	-127.50	-0.283	-127.90	n/a		n/a	
y2003	0.076	32.70	0.075	32.26	n/a		n/a	
y2004	-0.148	-68.59	-0.148	-68.78	n/a		n/a	
y2005	0.068	31.50	0.068	31.39	n/a		n/a	
y2006	0.057	26.53	0.057	26.49	n/a		n/a	
y2007					n/a		n/a	
y2008	-0.531	-247.10	-0.539	-245.00	n/a		n/a	
y2009	-0.894	-414.50	-0.902	-409.10	n/a		n/a	
y2010	-0.338	-153.40	-0.347	-154.10	n/a		n/a	
y2011	0.122	55.31	0.134	59.76	n/a		n/a	
y2012	-0.225	-97.16	-0.215	-92.04	n/a		n/a	
y2013	-0.175	-81.76	-0.163	-75.51	n/a		n/a	
y2014	-0.135	-63.31	-0.124	-57.62	n/a		n/a	
y2015	-0.013	-6.13	-0.002	-1.05	n/a		n/a	
y2016	-0.157	-74.31	-0.146	-68.34	n/a		n/a	
Rural Variables								
Rural	-0.027	-27.69	-0.015	-11.85	-0.015	-11.66	-0.015	-11.65
Rural x Financial Crisis (2008-2010)			0.043	16.94	0.001	0.55		
Rural x Post Crisis (2011-2016)			-0.065	-32.67	-0.046	-21.92		
r2008							0.030	6.87
r2009							-0.013	-3.03
r2010							-0.012	-2.84
r2011							-0.077	-17.89
r2012							-0.026	-5.08
r2013							-0.059	-14.15
r2014							-0.040	-9.22
r2015							-0.053	-12.28
r2016							-0.017	-4.03
Constant	-0.232	-41.39	-0.234	-41.71	-0.391	-72.58	-0.391	-72.60
State Fixed Effects	**Yes (Absorbed)**		**Yes (Absorbed)**		No		No	
State x Year Fixed Effects	No		No		**Yes (Absorbed)**		**Yes (Absorbed)**	
Observations	1,277,440		1,277,440		1,277,440		1,277,440	
R-squared	0.851		0.853		0.860		0.860	