The Real Effects of Credit Booms and Busts: A County-Level Analysis

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Abstract

We use a comprehensive data set of home hortgage loan originations from HMDA matched with the banks' income and balance sheet statements to analyze how fluctuations in the supply of mortgage credit affect county-level economic outcomes. To isolate fluctuations in the supply of mortgage credit, we use a variant of the shift-share identification approach of Greenstone et al. (2015), which exploits the fact that banks originate home mortgage loans across multiple counties. Our results indicate that in "booms," changes in the supply of home mortgage credit have no effect on a range of county-level economic outcomes, including house prices, employment, wages, and income. During "busts," by contrast, a supply-induced contraction in mortgage lending has significant—in both economic and statistical terms—adverse effects on county-level economic performance: During the 2007–2010 period, counties that experienced a reduction in the supply of mortgage credit also saw large declines in house prices and building permits, a decline in the employment-population ratio, an increase in the unemployment rate, and a drop in average wages and income per capita. Consistent with the presence of financial frictions, the pullback in the supply of mortgage credit led to a particularly severe job losses at small and young firms.

JEL Classification: E24, E32, E44, G01, G20
Keywords: mortgage lending, credit supply shocks, house prices, real economic activity

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1 Introduction

This paper aims to shed light on the interaction between shocks to the quality of bank balance sheets and the employment decisions of their likely borrowers, an area of investigation that has been hampered by the lack of systematic and comprehensive data linking banks with their potential borrowers. The persistent turmoil that roiled financial markets during the 2007–09 period—especially the unprecedented decline in house prices that materialized in the latter part of 2006—severely eroded the capital position of the banking industry. In response, many banks imposed significantly more stringent lending standards and terms on their borrowers in order to conserve their liquidity and balance sheet capacity (see Bassett et al. (2014)). An important question in both policy and academic circles is the extent to which the resulting pullback in credit-led firms—especially small, bank-dependent firms— led to slashed payrolls because they were unable to obtain the requisite bank financing to either maintain existing jobs or create new ones.

We hypothesize that during the 2007–09 crisis, firms located in geographic areas where banks experienced a more severe deterioration in their capital positions slashed their payrolls more than firms located in areas where banks were better able to absorb losses, either because of greater capital cushions or because of a smaller decline in house prices.

This paper advances the understanding of this important question in several dimensions. While Chodorow-Reich (2014) uses loan-level banking data, the study's scope is limited by the fact that syndicated lending is almost exclusively a province of large corporate borrowers, who typically have access to other forms of arm's-length finance (for example, corporate bond and equity markets). Moreover, because more than 80 percent of firms have fewer than 50 employees—and are therefore highly unlikely to tap the syndicated loan market to meet their external financing needs—it is important that any analysis of this question encompasses smaller firms, which tend to borrow extensively from commercial banks. Siemer (2012), in contrast, does focus on smaller firms, but lacks the corresponding data on the quality of bank balance sheets—information that is crucial for gaining a more complete understanding of how credit-supply shocks affect labor market conditions. Greenstone et al. (2015) use small business lending data from the community reinvestment act to examine the effect of bank supply shocks on employment outcomes. Their main finding is that bank supply shocks had only a economically small effect during the financial crisis of 2007-2009, accounted for at most 5% of the observed decline in employment.

Using data for home mortgage lending (HMDA) we find that bank supply shock had economically and statistically large effects on macroeconomic outcomes during the financial crisis.

2 Data Sources and Methods

The key data for our analysis comes from the Home Mortgage Disclosure Act (HMDA), which requires U.S. financial institutions to report home mortgage loan originations to their regulator.[1]

[1]Institutions subject to HMDA must meet certain criteria, such as having assets above a specific threshold.

A subset of institutions subject to HMDA are depository institutions, or "banks" for short.[2] Over the period from 1995 to 2015, we matched HMDA lending by these institutions with their income and balance sheet data from the Consolidated Financial Statements for Holding Companies (FR Y-9C) or the Reports of Condition and Income (Call Reports).[3]

- Panel (a) in Figure 1 shows the time-series evolution of the share of home mortgage loan originations accounted for by banks in our matched data set. Panel (b), in contrast, compares the growth of total HMDA home mortgage loan originations with that of banks. Clearly our matched sample is representative of the aggregate trends in mortgage lending: Between 1995 and 2015, bank-intermediated home mortgage lending accounted, on average, for almost two-thirds of all mortgage lending reported by HMDA, and the growth of total originations is virtually identical to the growth of originations by banks.

- Figure 2 highlights the coverage of bank-intermediated home mortgage lending in the cross-sectional dimension. In particular, for each county, we first calculate the share of home mortgage loan originations accounted for by banks in our matched data set. Then, we compute a county-specific average share bank-intermediated home mortgage loan originations over the sample period.

3 Identification Strategy I

Our first identification strategy is based closely on the approach of Greenstone et al. (2015), who seek to identify county-level shifts in the supply of commercial and industrial (C&I) loans to small businesses and to trace the effects of those shifts on local employment. Their identification approach, which relies on C&I lending to small businesses reported by banks under the Community Reinvestment Act (CRA), exploits the fact that banks make small business loans in a number of counties. Under fairly general conditions, this allows them to estimate a period- and bank-specific loan supply effect, which can then be aggregated to a county level, using banks' market shares as weights. Similarly, banks originate home mortgage loans across a number of counties, so the same empirical approach can be applied to HMDA data. Because we make several changes to their empirical approach, it is worth discussing their identification strategy in some detail.

Let $j = 1, \ldots, J_t$ index banks, $k = 1, \ldots, K_t$ counties, and $t = 1, \ldots, T$ time (in years). Then let $L^H_{j,k,t}$ denote the total dollar amount of home mortgage loan originations by bank j in county k in year t. For each pair of years $t-1$ and t, we then estimate the following regression:

$$\Delta \ln L^H_{j,k,t} = S_{j,t} + D_{k,t} + \epsilon_{j,k,t}, \tag{1}$$

[2] By "bank" we mean a top holder financial institution, such as a bank holding company (BHC) or a savings and loan holding company (SLHC).

[3] We restrict our analysis to mortgage originations extended in counties of the 48 contiguous U.S. states. We also dropped St. Bernard county, LA, from the analysis due to a massive displacement of its population resulting from the Hurricane Katrina.

using the sample of banks that originated home mortgage loans in multiple counties. In regression specification (1), $S_{j,t}$ denotes a (period-specific) bank fixed effect, while $D_{k,t}$ denotes a (period-specific) county fixed effect. As discussed by Greenstone et al. (2015), the estimates of $S_{j,t}$, $j = 1, \ldots, J_t$ capture a *bank-specific* shift in the supply of credit between years $t-1$ and t, while the estimates of $D_{k,t}$, $k = 1, \ldots, K_t$, capture a *county-specific* change in credit demand over the same period.

The fact that in any two consecutive years $t-1$ and t, our data consists of two cross-sectional dimensions—that is, across banks and across counties—provides two natural sets of weights, which are useful in identify the shifts in credit supply and demand. The first set of weights captures the importance of a particular bank in a given county. These weights—denoted by $b_{j,k,t}$—are given by

$$b_{j,k,t} = \frac{L^H_{j,k,t}}{\sum_{j \in \mathfrak{B}_{k,t}} L^H_{j,k,t}}, \tag{2}$$

where $\mathfrak{B}_{k,t}$ denotes a set of banks that are active lenders in county k during year t. In the estimation of regression (1), observations with relatively high b-weights—that is, where the market share of home mortgage lending of bank j in county k is high—are useful in identifying bank-specific credit supply effects. However, we can also define a set of weights that capture the importance of a particular county in a given bank's home mortgage loan portfolio. These weights—denoted by $c_{j,k,t}$—are given by

$$c_{j,k,t} = \frac{L^H_{j,k,t}}{\sum_{k \in \mathfrak{K}_{j,t}} L^H_{j,k,t}}, \tag{3}$$

where $\mathfrak{K}_{j,t}$ denotes a set of counties where bank j has originated home mortgage loans during year t. Observations with relatively high c-weights, in contrast, should be useful in identifying the county-specific credit demand effects. In order to balance these opposing forces, we estimate regression (1) by weighted least-squares (WLS), using the geometric average of the b-weights and c-weights in period $t-1$ as estimation weights.[4]

For any two consecutive years $t-1$ and t, the estimated bank fixed effects only identify relative shifts in the supply of home mortgage loans across banks. To take into account cross-sectional differences in bank size, we center the estimated bank fixed effects $\hat{S}_{j,t}$, $j = 1, 2, \ldots, J_t$, so that their asset-weighted mean (based on period $t-1$ assets) is equal to zero in each period t. Similarly, the estimated county fixed effects $\hat{D}_{k,t}$, $k = 1, 2, \ldots, K_t$, only identify relative shifts in the demand for home mortgages across counties; hence without the loss of generality, we center the estimated county fixed effects to have a mean equal to zero in each period. An estimate of a *county-level* shift in credit supply is then calculated as a weighted average of bank-specific supply effects in each county:

$$\hat{S}_{k,t} = \sum_{j \in \mathfrak{B}_{k,t-1}} \left(\frac{b_{j,k,t-1}}{\sum_{j \in \mathfrak{B}_{k,t-1}}} \right) \times \hat{S}_{j,t}; \quad k = 1, \ldots, K_t, \tag{4}$$

[4] Greenstone et al. (2015), in contrast, use only the b-weights when estimating regression (1) with the CRA data.

where $\hat{S}_{j,t}$ is the centered estimated fixed effect of bank j, $b_{j,k,t-1}$ is the market share of home mortgage lending of bank j in county k in year $t-1$, and $\mathfrak{B}_{k,t-1}$ denotes the set of counties than bank j was active in during that year. To put the estimated county-level credit supply effects on the same basis as the estimated demand effects, we center the cross-sectional distribution of $\hat{S}_{k,t}$, $k = 1, \ldots, K_t$, to have a mean equal to zero in each period.

3.1 Extensive and Intensive Margins of Mortgage Lending

In addition to recording the total dollar volume of home mortgage loan originations that a bank made in different counties in any given year, HMDA also collects information on the corresponding *number* of loans. Letting $N^H_{j,k,t}$ denote the number of home mortgage loan originations by bank j in county k during year t, the growth rate $\Delta \ln L^H_{j,k,t}$ can be decomposed as

$$\Delta \ln L^H_{j,k,t} = \Delta \ln N^H_{j,k,t} + \Delta \ln \bar{L}^H_{j,k,t},$$

where $\bar{L}^H_{j,k,t} = L^H_{j,k,t}/N^H_{j,k,t}$ is the *average* size of a loan by bank j in county k during year t. That is, we can decompose the growth rate of total home mortgage loan origination between any two years into two parts: the growth in the number of originated loans and the growth rate in the average size of a loan.

The black line in Figure 3 depicts the time series of the population-weighted average of the county-level growth rates of home mortgage loan originations based on the entire HMDA data set, while the red and green lines show the corresponding population-weighted average growth rates of the number of loan originations and the average size of a loan in each county, respectively. From the figure it is clear that fluctuations in home mortgage lending over time are driven primarily by changes in the number of loans extended, rather than by changes in the average size of the loan. Panel (a) of Figure 4 illustrates this point in the cross section. The red line depicts the time series of population-weighted correlations between the growth rate of total home mortgage loan originations and the growth rate in the number of originations across counties, while the green line depicts such correlations between the growth rate of total home mortgage loan originations and the growth rate of the average size of a loan. Panel (b), in contrast, shows the time series of population-weighted correlations between the growth rate in the number of home mortgage loan originations and the growth rate of the average size of a loan across counties.

Thus, if we replace the dependent variable $\Delta \ln L^H_{j,k,t}$ in regression (1) with $\Delta \ln N^H_{j,k,t}$, the estimate of $S_{j,t}$ will capture a change in loan supply on bank j's *extensive* margin, which we denote by $\hat{S}^E_{j,k,t}$; in contrast, when the dependent variable is equal to $\Delta \ln \bar{L}^H_{j,k,t}$, the estimate of $S_{j,t}$ will correspond to a supply change on bank j's *intensive* margin, which we denote by $\hat{S}^I_{j,k,t}$. For each of these three dependent variables, we estimate a sequence of regressions (1) over the 1995–2015 period, using a sample of banks and counties that satisfy the following criteria for any two consecutive years $t-1$ and t:

- Counties where the median share of bank-intermediated home mortgage lending over the

1995–2015 period is at least 25 percent.

- Banks with total assets greater than $100 million (in 2010 dollars) as of year $t-1$.
- Banks that originated home mortgage loans in at least four different counties between years $t-1$ and t.
- To minimize the effect of outliers on our estimates of supply and demand effects, we also delete from the sample all observations where $|\Delta \ln L^H_{j,k,t}| > 2$.

Some basic summary statistics of the data used to estimate the supply and demand effects are presented in Table A-1.

The vertical bars in Figure 5 show the period-specific R^2 from the estimation of regression (1), using $\Delta \ln L^H_{j,k,t}$ as the dependent variable (Panel (a)); $\Delta \ln N^H_{j,k,t}$ as the dependent variable (Panel (b)); and $\Delta \ln \bar{L}^H_{j,k,t}$ as the dependent variable (Panel (c)). The height of each bar represents the portion of the variability in each dependent variable explained by the bank and county fixed effects, while the red and blue portions represent the contribution of bank fixed effects and county fixed effects, respectively.

4 Identification Strategy II

Our second identification strategy relies explicitly on bank balance sheet items (e.g. real estate delinquincy rates and charge-off rates, etc.). Bank balance sheet data are available through the Call Reports at the bank level. To construct regional indices of banking conditions we project items from the bank balance sheet item $BC_{j,t}$ onto the county using the market share of banks as defined in equation 2. The counoty level banking condition measure, $BC_{k,t}$, then is computed as

$$BC_{k,t} = \sum_{j \in \mathfrak{B}_{k,t}} b_{j,k,t} BS_{j,t} \tag{5}$$

One concern is that a deterioration of balance sheet conditions could be caused by local demand conditions in a given county. To account for that use the estimate of the county level demand measure $\hat{D}_{k,t}$, as estimated in the first identification strategy plus a number of county observables to capture local demand conditions.

$$BC_{k,t} = \beta_t \hat{D}_{k,t} + \gamma_t X_{k,t} + \varepsilon_{k,t} \tag{6}$$

We then use the residual $\hat{\varepsilon_{k,t}}$ as our measure of bank balance sheet condition at the county level. In the second step we then instrument the change in home mortgage lending at the county level with this county level banking condition measure. One potential concern of this methodology is that events at the county level could affect the balance sheet of the bank and thus lead to reverse causality. To rule out reverse causality we limit the sample to the 50 largest banks.[5]

[5]The main findings are robust to a sample of the top 5 or top 25 banks.

5 Credit Supply Effects and Home Mortgage Lending

To zero in on how our estimated supply effects affect home mortgage lending across counties, we focus on two subperiods of the 1995–2015 sample period: the "boom" period from 2003 to 2006, and the "bust" period from 2007 to 2010. For each of these two subsamples, we consider a cross-sectional regression of the form:

$$\Delta_3 \ln L^H_{k,t} = \beta_0 \hat{S}_{k,t} + \beta_1 \hat{S}_{k,t-1} + \beta_2 \hat{S}_{k,t-2} + \boldsymbol{\gamma}' \mathbf{X}_k + \epsilon_{k,t}, \tag{7}$$

where $\Delta_3 \ln L^H_{k,t} = (\ln L^H_{k,t} - \ln L^H_{k,t-3})/3$ denotes the annualized growth of home mortgage lending in county k from year $t-3$ to year t, $\hat{S}_{k,t}$, $\hat{S}_{k,t-1}$, and $\hat{S}_{k,t-2}$ are the estimated credit supply effects within this three-year period, and $\mathbf{X}_k$ is a vector of pre-determined county characteristics (including a constant) that could influence the demand for and supply of home mortgages. Specifically, the vector $\mathbf{X}_k$ includes variables that control for differences in counties in the following dimensions:

- *Rural vs. urban counties*: An indicator variable for whether a county is in a rural area (RURAL_k)—that is, not a part of the Core Based Statistical Area (CBSA).

- *Industry composition*: To control for differences in the composition of economic activity across counties, we use the industry-level employment data from the County Business Patterns (CBP) to calculate the share of county employment in the following four broad sectors: construction ($\text{EMP-CONST}_{k,t}$), tradable goods industries ($\text{EMP-TRD}_{k,t}$), nontradable goods industries ($\text{EMP-NONTRD}_{k,t}$), and other industries ($\text{EMP-OTH}_{k,t}$, the omitted category).[6] These controls enter the vector $\mathbf{X}_k$ as of year $t-4$.

- *Racial composition*: To control for differences in racial composition across counties, we use the 2000 Census data to calculate the share of county population that is black ($\text{SHR-BLACK}_{k,2000}$), white ($\text{SHR-WHITE}_{k,2000}$), and other ($\text{SHR-OTH}_{k,2000}$, the omitted category).

- *Educational attainment*: To control for differences in educational attainment across counties, we use the 2000 Census data to calculate the share of county population that does not have a high school diploma ($\text{SHR-LESS-HS}_{k,2000}$), the share that has a four-year college degree or higher ($\text{SHR-COLLEGE}_{k,2000}$), and the share that has a high school diploma and possibly some college ($\text{SHR-HS}_{k,2000}$, the omitted category).

- *Poverty rate*: To control for differences in income across counties, we include the county-level poverty rate ($\text{POVERTY}_{k,t}$) from The Small Area Income and Poverty Estimates (SAIPE) program in the vector of control variables $\mathbf{X}_k$. The poverty rate enters the vector $\mathbf{X}_k$ as of year $t-4$.

- *Banking concentration*: To control for differences in bank concentration across counties, we use our matched bank-HMDA data set to calculate the Herfindahl-Hirschman Index ($\text{HHI}_{k,t}$)

[6] In constructing these employment shares, we follow the methodology of Mian and Sufi (2014).

of bank concentration for each county and year. The HHI enters the vector $\mathbf{X}_k$ as of year $t-4$.

And lastly, we also consider specifications that include state fixed effects. In all cases, we estimate regression (7) by weighted LS, using county populations at $t-4$ as weights. The results of this exercise are reported in Tables **??**, **??**, and **??**.

6 Credit Supply Effects and Economic Activity

To understand how changes in the supply home mortgage credit affect local economic outcomes, we estimate the following cross-sectional regression for each of our two subsamples:

$$\Delta_3 Y_{k,t} = \beta \Delta_3 \ln L^H_{k,t} + \boldsymbol{\gamma}' \mathbf{X}_k + \eta_s + \epsilon_{k,t}, \tag{8}$$

where $\Delta_3 Y_{k,t}$ denotes the annualized change in an indicator of economic conditions in county k from year $t-3$ to year t, $\Delta_3 \ln L^H_{k,t}$ is corresponding annualized three-year log-difference of home mortgage lending in county k, $\mathbf{X}_k$ is the vector of control variables discussed above, and η_s denotes a state fixed effect.

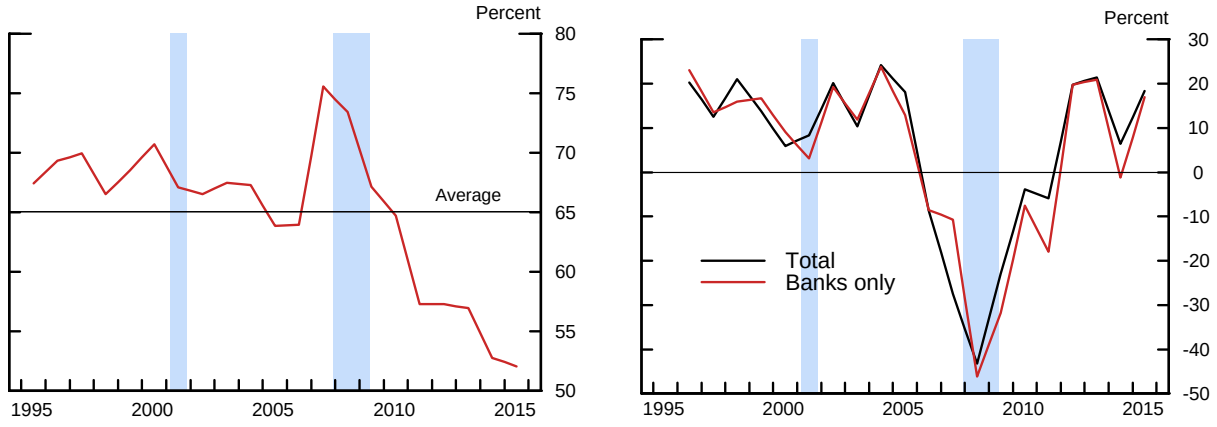
We consider the following county-level economic indicators:

- The log of (nominal) house price indexes (2010 = 100) as measured by the Federal Housing Finance Agency (FHFA).
- The log of the ratio of single-family building permits to population.
- The log of the ratio of private-sector employment to population.
- The unemployment rate.
- The log of the ratio of the number of firms to population.
- The log of the ratio of (nominal) private-sector wages to the number of employees.
- The log of (nominal) personal income per capita.

Selected summary statistics for these variables are reported in Table A-2.

As a baseline, Table 3 reports the results from estimating regression (8) by weighted LS. The results using the estimated county-level credit supply effects at the *extensive* margin $\hat{S}^E_{k,t}$, $\hat{S}^E_{k,t-1}$, and $\hat{S}^E_{k,t-2}$ as instruments for $\Delta_3 \ln L^H_{k,t}$ are reported in Table 4. And lastly, Table 5 reports the results from the IV estimation of regression (8), which also includes $\Delta_3 Y_{k,t-3}$ as an explanatory variable.

FIGURE 1 – Home Mortgage Lending: Total vs. Banks Only

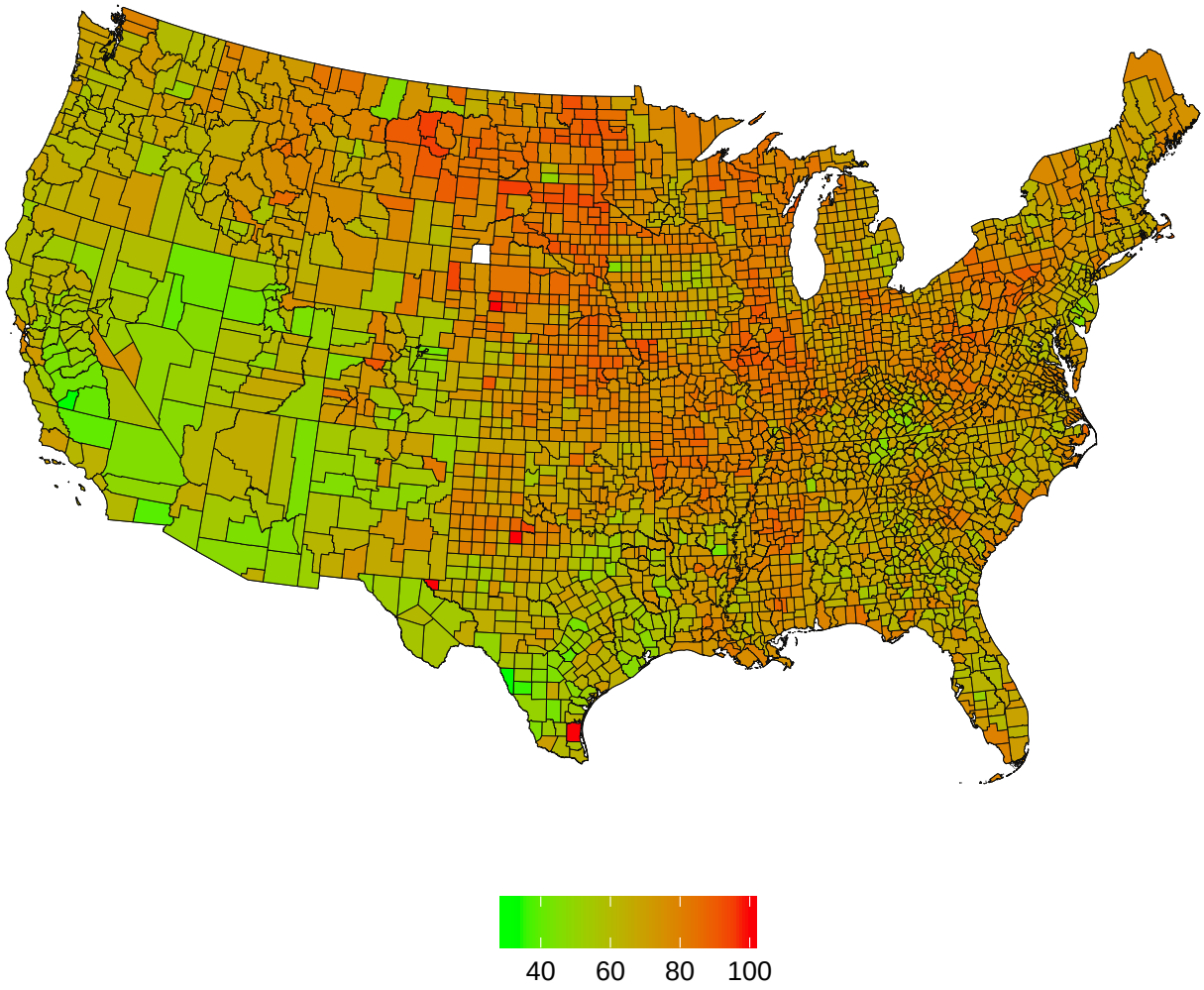


(a) Bank share of originations

(b) Growth of originations

NOTE: Panel (a) shows the banks' share of total home mortgage loan originations in HMDA. The black line in Panel (b) depicts the growth rate of total HMDA home mortgage loan originations, while the red line depicts the growth rate of home mortgage loans originated by banks only. The shaded vertical bars represent the NBER-dated recessions.

FIGURE 2 – Bank-Intermediated Home Mortgage Lending

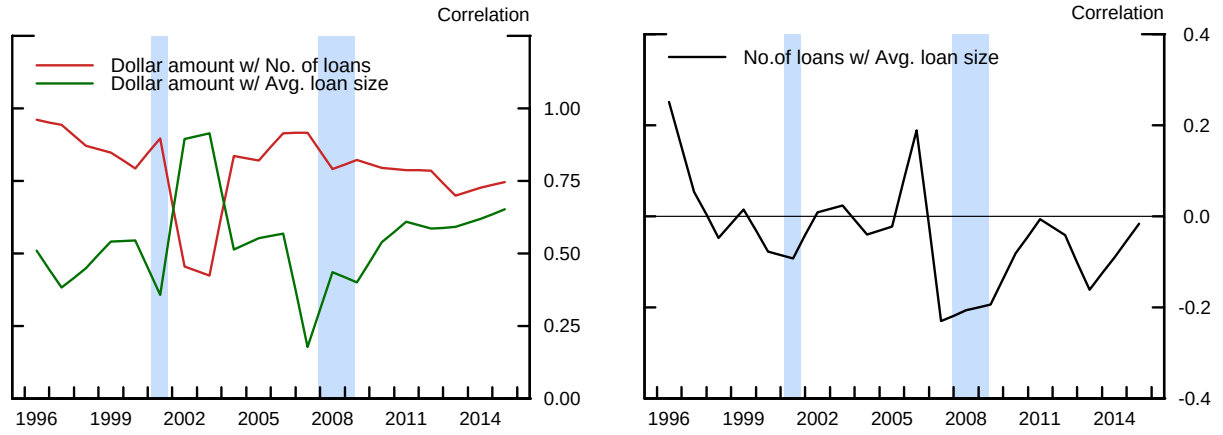


NOTE: The county-level heat map shows the share of home mortgage loan originations in HMDA, accounted for by banks—on average—over the 1995–2015 period.

FIGURE 3 – Growth in Home Mortgage Lending

NOTE: The black line depicts the population-weighted average of the county-level growth rates of the dollar amount of home mortgage loan originations based on the entire HMDA data set; the red depicts the population-weighted average growth rate of the number of loan originations in each county; and the green line depicts the population-weighted average growth rate of the average size of a loan in each county. The shaded vertical bars represent the NBER-dated recessions.

FIGURE 4 – Home Mortgage Lending: Cross-Sectional Correlations

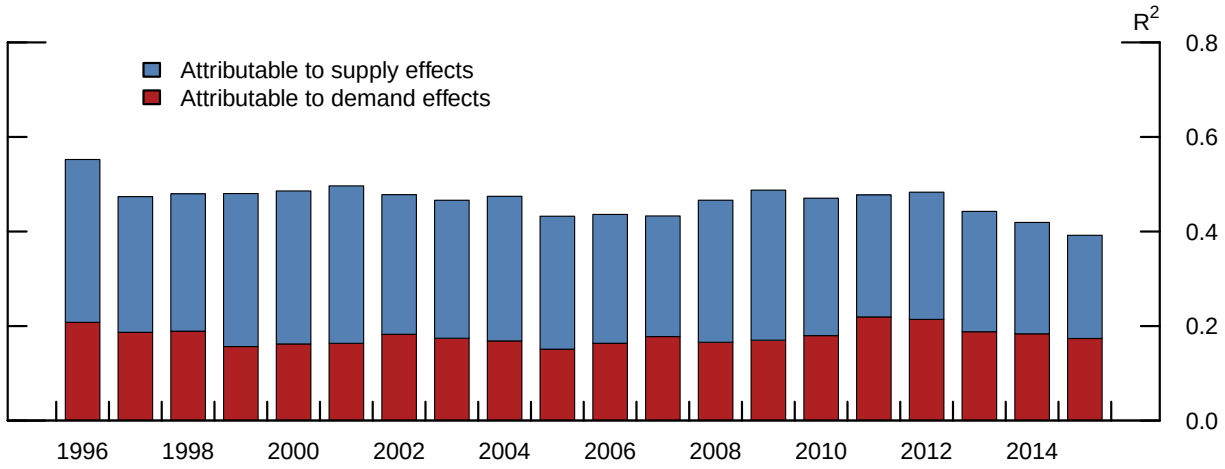


(a) Correlations across counties

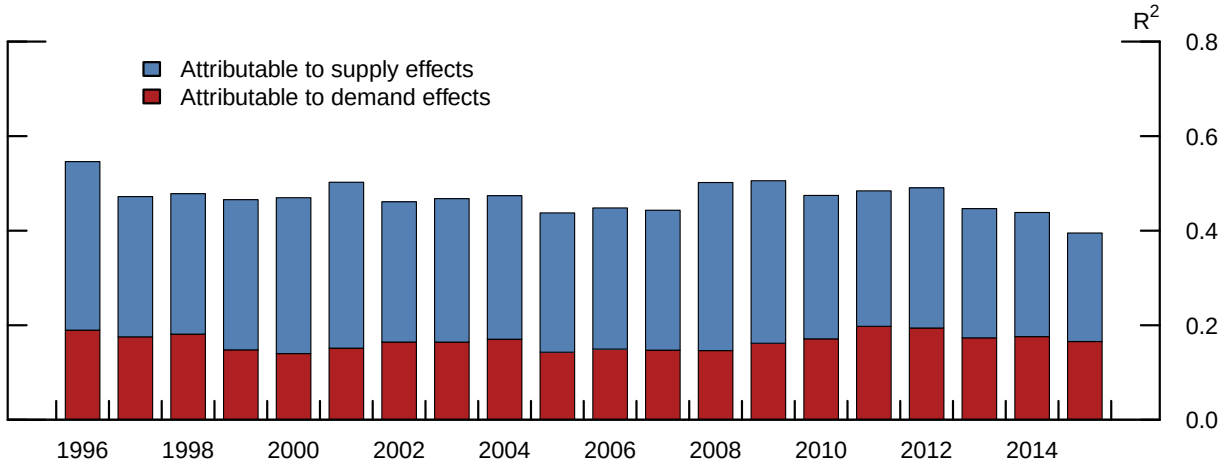
(b) Correlations across counties

NOTE: The red line in Panel (a) depicts the population-weighted correlations between the growth rate of dollar amount of home mortgage loan originations and the growth rate in the number of originations across counties in each year, while the green line depicts such correlations between the growth rate of the dollar amount of home mortgage loan originations and the growth rate of the average size of a loan. The black line in Panel (b) depicts the population-weighted correlations between the growth rate in the number of home mortgage loan originations and the growth rate of the average size of a loan across counties in each year.

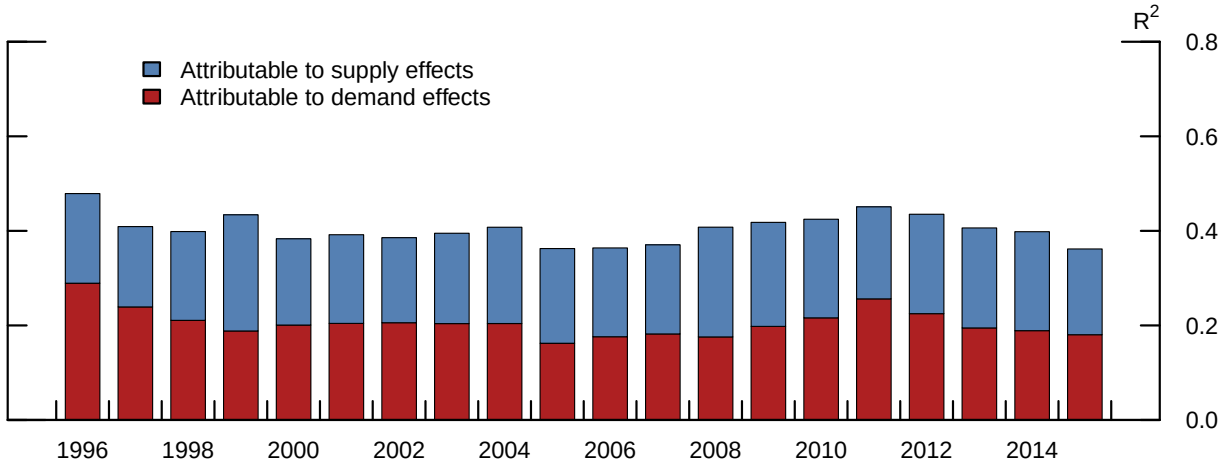
FIGURE 5 – Goodness of Fit



(a) Dependent variable: $\Delta \ln L^H_{j,k,t}$



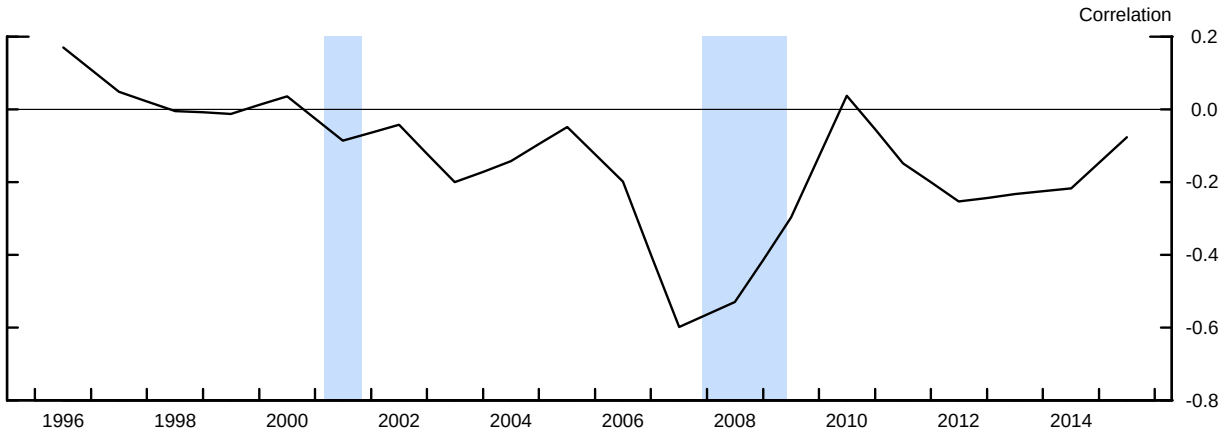
(b) Dependent variable: $\Delta \ln N^H_{j,k,t}$



(c) Dependent variable: $\Delta \ln \bar{L}^H_{j,k,t}$

NOTE: Each vertical bar depicts the period-specific R^2 from the WLS estimation of regression (1) for the specified dependent variable. The red part of each bar corresponds to the portion of R^2 that is attributable to county fixed effects, and the blue part corresponds to the portion of R^2 that is attributable to bank fixed effects.

FIGURE 6 – Correlation Between the Supply Effects at Extensive and Intensive Margins



NOTE: The figure depicts the population-weighted correlations between the estimated extensive margin supply effects and the intensive margin supply effects across counties in each year. The shaded vertical bars represent the NBER-dated recessions.

TABLE 1 – Supply and Demand Effects and Home Mortgage Lending

	Dependent Variable: $\Delta_3 \ln L^H_{k,t}$			
	2003–2006		2007–2009	
Explanatory Variables	(1)	(2)	(3)	(4)
$\hat{S}_{k,t}$	0.301***	0.132***	0.226***	0.083***
	(0.049)	(0.034)	(0.029)	(0.020)
$\hat{S}_{k,t-1}$	0.263***	0.133***	0.133***	0.137***
	(0.058)	(0.045)	(0.031)	(0.018)
$\hat{S}_{k,t-2}$	0.037	0.047	0.242***	0.138***
	(0.043)	(0.031)	(0.040)	(0.024)
$\hat{D}_{k,t}$	0.113***	0.073***	0.093***	0.071***
	(0.012)	(0.009)	(0.010)	(0.007)
$\hat{D}_{k,t-1}$	0.150***	0.088***	0.111***	0.086***
	(0.014)	(0.011)	(0.011)	(0.008)
$\hat{D}_{k,t-2}$	0.094***	0.070***	0.155***	0.085***
	(0.011)	(0.010)	(0.013)	(0.008)
$\Pr > W_S$ [a]	<.001	<.001	<.001	<.001
$\Pr > W_D$ [b]	<.001	<.001	<.001	<.001
Sum: supply effects[c]	0.602***	0.313***	0.600***	0.358***
	(0.089)	(0.068)	(0.051)	(0.029)
Sum: demand effects[d]	0.357***	0.231***	0.358***	0.243***
	(0.028)	(0.022)	(0.023)	(0.014)
State fixed effects	No	Yes	No	Yes
R^2	0.480	0.630	0.467	0.665
No. of counties	2,704		2,703	

NOTE: The dependent variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage originations in county k over the specified 3-year period. The explanatory variables are the estimated county-level supply effects $\hat{S}_{k,t-h}$ and demand effects $\hat{D}_{k,t-h}$ within the specified 3-year period ($h = 0, 1, 2$). All specifications include a constant, a set of county-level controls (not reported), and are estimated by WLS using county populations in $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Wald test of null hypothesis that the coefficients on $\hat{S}_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[b] p-value for the Wald test of null hypothesis that the coefficients on $\hat{D}_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[c] Sum of coefficients on $\hat{S}_{k,t-h}$, $h = 0, 1, 2$.

[d] Sum of coefficients on $\hat{D}_{k,t-h}$, $h = 0, 1, 2$.

TABLE 2 – Supply and Demand Effects and Home Mortgage Lending

	Dependent Variable: $\Delta_3 \ln L^H_{k,t}$			
	2003–2006		2007–2009	
Explanatory Variables	(1)	(2)	(3)	(4)
$\hat{S}^E_{k,t}$	0.328***	0.147***	0.188***	0.064***
	(0.052)	(0.036)	(0.032)	(0.023)
$\hat{S}^E_{k,t-1}$	0.303***	0.130***	0.152***	0.150***
	(0.064)	(0.049)	(0.029)	(0.018)
$\hat{S}^E_{k,t-2}$	0.014	0.046	0.225***	0.133***
	(0.043)	(0.031)	(0.038)	(0.024)
$\hat{S}^I_{k,t}$	0.168*	0.041	0.204***	0.141***
	(0.090)	(0.068)	(0.058)	(0.047)
$\hat{S}^I_{k,t-1}$	0.122	0.157**	−0.141***	0.038
	(0.089)	(0.073)	(0.052)	(0.040)
$\hat{S}^I_{k,t-2}$	0.177*	0.060	−0.020	0.106**
	(0.096)	(0.080)	(0.069)	(0.045)
$\hat{D}_{k,t}$	0.110***	0.072***	0.087***	0.072***
	(0.012)	(0.009)	(0.010)	(0.007)
$\hat{D}_{k,t-1}$	0.149***	0.088***	0.105***	0.085***
	(0.014)	(0.011)	(0.010)	(0.008)
$\hat{D}_{k,t-2}$	0.095***	0.071***	0.148***	0.084***
	(0.011)	(0.010)	(0.012)	(0.008)
$\Pr > W_{S/E}$ [a]	<.001	<.001	<.001	<.001
$\Pr > W_{S/I}$ [b]	0.071	0.195	<.001	0.002
$\Pr > W_D$ [c]	<.001	<.001	<.001	<.001
Sum: supply effects – extensive [d]	0.645***	0.323***	0.565***	0.347***
	(0.090)	(0.067)	(0.044)	(0.030)
Sum: supply effects – intensive [e]	0.467**	0.258*	0.043	0.285***
	(0.180)	(0.149)	(0.118)	(0.082)
Sum: demand effects [f]	0.354***	0.230***	0.340***	0.240***
	(0.027)	(0.022)	(0.021)	(0.015)
State fixed effects	No	Yes	No	Yes
R^2	0.484	0.631	0.486	0.667
No. of counties	2,704		2,703	

NOTE: The dependent variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage originations in county k over the specified 3-year period. The explanatory variables are the estimated county-level supply effects at the extensive margin $\hat{S}^E_{k,t-h}$, supply effects at the intensive margin $\hat{S}^I_{k,t-h}$, and demand effects $\hat{D}_{k,t-h}$ within the specified 3-year period ($h = 0, 1, 2$). All specifications include a constant, a set of county-level controls (not reported), and are estimated by WLS using county populations in $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Wald test of null hypothesis that the coefficients on $\hat{S}^E_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[b] p-value for the Wald test of null hypothesis that the coefficients on $\hat{S}^I_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[c] p-value for the Wald test of null hypothesis that the coefficients on $\hat{D}_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[d] Sum of coefficients on $\hat{S}^E_{k,t-h}$, $h = 0, 1, 2$.

[e] Sum of coefficients on $\hat{S}^I_{k,t-h}$, $h = 0, 1, 2$.

[f] Sum of coefficients on $\hat{D}_{k,t-h}$, $h = 0, 1, 2$.

TABLE 3 – Home Mortgage Lending and Economic Outcomes: Booms vs. Busts
(LS Regressions)

	Dependent Variable: $\Delta_3 Y_{k,t}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. *Sample period*: 2003–2006							
$\Delta_3 \ln L^H_{k,t}$	0.112^{***}	0.717^{***}	0.014^{**}	-0.002	-0.013^{**}	0.026^{***}	0.012
	(0.015)	(0.065)	(0.006)	(0.001)	(0.006)	(0.007)	(0.009)
R^2	0.877	0.357	0.183	0.654	0.402	0.263	0.428
No. of counties	2,528	2,479	2,698	2,698	2,701	2,701	2,704
B. *Sample period*: 2007–2010							
$\Delta_3 \ln L^H_{k,t}$	0.109^{***}	0.951^{***}	0.038^{***}	-0.012^{***}	0.024^{***}	0.037^{***}	0.049^{***}
	(0.012)	(0.069)	(0.006)	(0.001)	(0.004)	(0.006)	(0.009)
R^2	0.877	0.404	0.431	0.793	0.581	0.153	0.554
No. of counties	2,543	2,424	2,694	2,705	2,695	2,695	2,705

NOTE: The dependent variable is $\Delta_3 Y_{k,t}$, the annualized change in an economic indicator of county k over the specified 3-year period: (1) log of (nominal) house prices; (2) log of single-family building permits to population ratio; (3) log of (private sector) employment to population ratio; (4) unemployment rate; (5) log of number of firms to population ratio; (6) log of (private-sector) wages per employee; and (7) log of personal income per capita. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage loan originations in county k over the same 3-year period. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted LS, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

TABLE 4 – Home Mortgage Lending and Economic Outcomes: Booms vs. Busts
(IV Regressions – Identification Strategy I)

	Dependent Variable: $\Delta_3 Y_{k,t}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. *Sample period*: 2003–2006							
$\Delta_3 \ln L^H_{k,t}$	0.153	−0.249	0.111	0.024	0.027	0.073	0.058
	(0.144)	(0.751)	(0.079)	(0.017)	(0.052)	(0.090)	(0.090)
Pr > CLR[a]	0.579	0.685	0.114	0.034	0.058	0.548	0.584
Pr > J[b]	0.367	0.742	0.463	0.633	0.011	0.038	0.700
No. of counties	2,528	2,479	2,698	2,698	2,701	2,701	2,704
B. *Sample period*: 2007–2010							
$\Delta_3 \ln L^H_{k,t}$	0.493***	2.175***	0.077***	−0.042***	0.047***	0.134***	0.302***
	(0.070)	(0.317)	(0.026)	(0.007)	(0.014)	(0.030)	(0.043)
Pr > CLR[a]	<.001	<.001	0.008	<.001	0.004	0.001	<.001
Pr > J[b]	0.517	0.235	0.631	0.096	0.269	0.618	0.937
No. of counties	2,543	2,423	2,693	2,703	2,694	2,694	2,703

NOTE: The dependent variable is $\Delta_3 Y_{k,t}$, the annualized change in an economic indicator of county k over the specified 3-year period: (1) log of (nominal) house prices; (2) log of single-family building permits to population ratio; (3) log of (private sector) employment to population ratio; (4) unemployment rate; (5) log of number of firms to population ratio; (6) log of (private-sector) wages per employee; and (7) log of personal income per capita. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage loan originations in county k over the same 3-year period, which is instrumented with the estimated county-level extensive margin credit supply effects $\hat{S}^E_{k,t}$, $\hat{S}^E_{k,t-1}$, and $\hat{S}^E_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.
[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.
[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

TABLE 5 – Home Mortgage Lending, Initial Conditions, and Economic Outcomes: Booms vs. Busts
(IV Regressions – Identification Strategy I)

	Dependent Variable: $\Delta_3 Y_{k,t}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. *Sample period*: 2003–2006							
$\Delta_3 \ln L^H_{k,t}$	0.292*	−0.116	0.097	0.026	0.011	0.066	0.054
	(0.168)	(0.731)	(0.075)	(0.017)	(0.047)	(0.087)	(0.086)
$\Delta_3 Y_{k,t-3}$	0.298***	−0.035	−0.111***	−0.119**	0.117***	−0.070**	−0.255***
	(0.114)	(0.059)	(0.027)	(0.049)	(0.034)	(0.035)	(0.068)
Pr > CLR[a]	0.470	0.766	0.167	0.028	0.048	0.595	0.599
Pr > J[b]	0.212	0.530	0.452	0.640	0.006	0.040	0.754
No. of counties	2,289	2,413	2,692	2,698	2,695	2,695	2,704
B. *Sample period*: 2007–2010							
$\Delta_3 \ln L^H_{k,t}$	0.453***	2.199***	0.075***	−0.035***	0.050***	0.128***	0.277***
	(0.071)	(0.318)	(0.026)	(0.006)	(0.014)	(0.030)	(0.041)
$\Delta_3 Y_{k,t-3}$	−0.214***	−0.046	−0.038	−0.345***	0.055	−0.057**	−0.229***
	(0.061)	(0.049)	(0.023)	(0.051)	(0.040)	(0.028)	(0.056)
Pr > CLR[a]	<.001	<.001	0.009	<.001	0.002	<.001	<.001
Pr > J[b]	0.377	0.242	0.626	0.034	0.212	0.621	0.938
No. of counties	2,526	2,375	2,690	2,679	2,691	2,691	2,703

NOTE: The dependent variable is $\Delta_3 Y_{k,t}$, the annualized change in an economic indicator of county k over the specified 3-year period: (1) log of (nominal) house prices; (2) log of single-family building permits to population ratio; (3) log of (private sector) employment to population ratio; (4) unemployment rate; (5) log of number of firms to population ratio; (6) log of (private-sector) wages per employee; and (7) log of personal income per capita. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage loan originations in county k over the same 3-year period, which is instrumented with the estimated county-level extensive margin credit supply effects $\hat{S}^E_{k,t}$, $\hat{S}^E_{k,t-1}$, and $\hat{S}^E_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.
[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.
[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

TABLE 6 – Home Mortgage Lending and Employment by Firm Size and Age: Booms vs. Busts
(IV Regressions – Identification Strategy I)

	Dependent Variable: $\Delta_3 \ln[E/P]_{k,t}$			
	By Firm Size		By Firm Age	
Explanatory Variables	Small	Large	Young	Old
A. *Sample period*: 2003–2006				
$\Delta_3 \ln L^H_{k,t}$	0.009	0.271	0.328	0.047
	(0.080)	(0.187)	(0.235)	(0.096)
Pr > CLR[a]	0.937	0.081	0.264	0.643
Pr > J[b]	0.252	0.499	0.532	0.462
No. of counties	2,348	2,348	2,669	2,669
B. *Sample period*: 2007–2010				
$\Delta_3 \ln L^H_{k,t}$	0.138***	0.024	0.312***	0.020
	(0.029)	(0.055)	(0.095)	(0.030)
Pr > CLR[a]	<.001	0.672	0.002	0.536
Pr > J[b]	0.324	0.748	0.521	0.708
No. of counties	2,361	2,361	2,682	2,683

NOTE: The dependent variable is $\Delta_3 \ln[E/P]_{k,t}$, the annualized log-difference in the employment-population ratio by firm size and age of county k over the specified 3-year period. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage loan originations in county k over the same 3-year period, which is instrumented with the estimated county-level extensive margin credit supply effects $\hat{S}^E_{k,t}$, $\hat{S}^E_{k,t-1}$, and $\hat{S}^E_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.

[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

TABLE 7 – Home Mortgage Lending and Sectoral Employment: Booms vs. Busts
(IV Regressions – Identification Strategy I)

	Dependent Variable: $\Delta_3 \ln[E/P]_{k,t}$			
Explanatory Variables	CST	TRD	NTR	OTH
A. *Sample period*: 2003–2006				
$\Delta_3 \ln L^H_{k,t}$	0.254	0.413	−0.000	0.148
	(0.187)	(0.337)	(0.077)	(0.119)
Pr > CLR[a]	0.235	0.138	0.984	0.084
Pr > J[b]	0.802	0.178	0.683	0.450
No. of counties	2,704	2,702	2,704	2,704
B. *Sample period*: 2007–2010				
$\Delta_3 \ln L^H_{k,t}$	0.280***	0.163	−0.023	0.067**
	(0.069)	(0.108)	(0.029)	(0.032)
Pr > CLR[a]	<.001	0.122	0.500	0.031
Pr > J[b]	0.350	0.239	0.027	0.494
No. of counties	2,703	2,701	2,682	2,703

NOTE: The dependent variable is $\Delta_3 \ln[E/P]_{k,t}$, the annualized log-difference in the sectoral employment-population ratio of county k over the specified 3-year period: CST = construction; TRD = tradable goods; NTR = nontradable goods; and OTH = other. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage loan originations in county k over the same 3-year period, which is instrumented with the estimated county-level extensive margin credit supply effects $\hat{S}^E_{k,t}$, $\hat{S}^E_{k,t-1}$, and $\hat{S}^E_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.

[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

TABLE 8 – Home Mortgage Lending and Economic Outcomes: Booms vs. Busts
(IV Regressions – Identification Strategy II)

	Dependent Variable: $\Delta_3 Y_{k,t}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. *Sample period*: 2003–2006							
$\Delta_3 \ln L^H_{k,t}$	0.093	0.005	−0.045	0.006	−0.005	−0.084	−0.002
	(0.114)	(0.455)	(0.061)	(0.008)	(0.038)	(0.061)	(0.068)
Pr > CLR[a]	0.828	0.393	0.323	0.395	0.424	0.803	0.124
Pr > J[b]	0.179	0.058	0.351	0.503	0.083	0.109	0.032
No. of counties	2,134	2,204	2,348	2,351	2,350	2,350	2,357
B. *Sample period*: 2007–2010							
$\Delta_3 \ln L^H_{k,t}$	0.615***	2.594***	0.115***	−0.035***	0.088**	0.066*	0.211***
	(0.131)	(0.618)	(0.043)	(0.012)	(0.035)	(0.039)	(0.061)
Pr > CLR[a]	<.001	<.001	0.186	< 0.001	0.003	0.166	0.043
Pr > J[b]	0.261	0.035	0.378	0.010	0.857	0.199	0.063
No. of counties	2,286	2,179	2,345	2,347	2,346	2,346	2,353

NOTE: The dependent variable is $\Delta_3 Y_{k,t}$, the annualized change in an economic indicator of county k over the specified 3-year period: (1) log of (nominal) house prices; (2) log of single-family building permits to population ratio; (3) log of (private sector) employment to population ratio; (4) unemployment rate; (5) log of number of firms to population ratio; (6) log of (private-sector) wages per employee; and (7) log of personal income per capita. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage loan originations in county k over the same 3-year period, which is instrumented with the county-level annual change in the log of construction and land development (CLD) delinquincies $\Delta lnD^{CLD}_{k,t}$, $\Delta lnD^{CLD}_{k,t-1}$, $\Delta lnD^{CLD}_{k,t-2}$ and the level of CLD charge-off rates $CR^{CLD}_{k,t}$, $CR^{CLD}_{k,t-1}$, $CR^{CLD}_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.

[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

TABLE 9 – Home Mortgage Lending and Employment by Firm Size and Age: Booms vs. Busts
(IV Regressions – Identification Strategy II)

	Dependent Variable: $\Delta_3 \ln[E/P]_{k,t}$			
	By Firm Size		By Firm Age	
Explanatory Variables	Small	Large	Young	Old
A. *Sample period*: 2003–2006				
$\Delta_3 \ln L^H_{k,t}$	0.063	0.207	−0.053	0.170
	(0.109)	(0.215)	(0.333)	(0.165)
Pr > CLR[a]	0.126	0.591	0.980	0.436
Pr > J[b]	0.139	0.971	0.742	0.889
No. of counties	1,599	1,599	1,759	1,759
B. *Sample period*: 2007–2010				
$\Delta_3 \ln L^H_{k,t}$	0.144***	0.001	−0.070	0.088
	(0.043)	(0.074)	(0.136)	(0.056)
Pr > CLR[a]	0.005	0.929	0.707	0.166
Pr > J[b]	0.162	0.272	0.905	0.022
No. of counties	2,129	2,129	2,324	2,324

NOTE: The dependent variable is $\Delta_3 \ln[E/P]_{k,t}$, the annualized log-difference in the employment-population ratio by firm size and age of county k over the specified 3-year period. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage loan originations in county k over the same 3-year period, which is instrumented with the county-level annual change in the log of construction and land development (CLD) delinquincies $\Delta lnD^{CLD}_{k,t}$, $\Delta lnD^{CLD}_{k,t-1}$, $\Delta lnD^{CLD}_{k,t-2}$ and the level of CLD charge-off rates $CR^{CLD}_{k,t}$, $CR^{CLD}_{k,t-1}$, $CR^{CLD}_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.

[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

TABLE 10 – Home Mortgage Lending and Employment Categories: Booms vs. Busts
(IV Regressions – Identification Strategy II)

	Dependent Variable: $\Delta_3 \ln[E/P]_{k,t}$			
Explanatory Variables	CST	TRD	NTR	OTH
A. *Sample period*: 2003–2006				
$\Delta_3 \ln L^H_{k,t}$	−0.026	0.483*	−0.056	−0.174*
	(0.142)	(0.265)	(0.076)	(0.096)
Pr > CLR[a]	0.972	0.199	0.074	0.018
Pr > J[b]	0.809	0.769	0.078	0.790
No. of counties	2,356	2,355	2,356	2,356
B. *Sample period*: 2007–2010				
$\Delta_3 \ln L^H_{k,t}$	0.672***	−0.037	0.065	0.015
	(0.158)	(0.155)	(0.044)	(0.049)
Pr > CLR[a]	<.001	0.754	0.092	0.927
Pr > J[b]	0.064	0.373	0.094	0.159
No. of counties	2,353	2,352	2,353	2,353

NOTE: The dependent variable is $\Delta_3 \ln[E/P]_{k,t}$, the annualized log-difference in the sectoral employment-population ratio of county k over the specified 3-year period: CST = construction; TRD = tradable goods; NTR = nontradable goods; and OTH = other. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of home mortgage loan originations in county k over the same 3-year period, which is instrumented with the county-level annual change in the log of construction and land development (CLD) delinquincies $\Delta lnD^{CLD}_{k,t}$, $\Delta lnD^{CLD}_{k,t-1}$, $\Delta lnD^{CLD}_{k,t-2}$ and the level of CLD charge-off rates $CR^{CLD}_{k,t}$, $CR^{CLD}_{k,t-1}$, $CR^{CLD}_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.

[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

Appendix Materials

A Supplementary Figures and Tables

TABLE A-1 – Summary Statistics of the Data Used in Estimation

Variable	Mean	StdDev	Min	Median	Max
No. of counties per year	2,904.0	89.3	2,562	2,926.5	2,957
No. of banks per year	1,623.2	272.7	1,038	1,637.5	1,962
Total obs. per year	49,062.2	11,630.7	25,043	49,130	71,052
Banks per county	30.2	138.5	4	7	2,697
Bank size[a] (billions)	6.97	67.15	0.10	0.51	2,370.2
Growth in mortgage lending: (%)					
– total	4.80	78.56	−200.00	4.98	200.00
– no. of loans	0.65	69.74	−453.26	0.00	611.81
– avg. loan size	4.05	46.87	−518.36	4.26	481.91

NOTE: Sample period: annual data from 1995 to 2015.
[a] As measured by total assets deflated by the CPI (2010 = 100).

TABLE A-2 – County-Level Economic Performance: Booms vs. Busts

Variable	Mean	StdDev	Min	Median	Max
A. *Sample period*: 2003–2006					
Mortgage lending	11.39	8.44	−46.81	10.62	85.99
House prices	8.93	5.58	−2.84	7.44	20.78
Building permits/population	−3.86	14.69	−99.09	2.44	120.06
Employment/population	0.74	1.30	−11.60	1.37	13.38
Unemployment rate[a]	−0.45	0.32	−2.40	−0.23	1.77
No. of firms/population	0.58	1.12	−11.86	1.28	8.11
Wages per employee	3.60	1.41	−11.88	4.30	13.93
Income per capita	4.94	1.94	−11.07	6.03	25.86
Memo: Population in 2002[b]	103.39	318.36	1.32	30.54	9,705.91
B. *Sample period*: 2007–2010					
Mortgage lending	−23.68	8.86	−93.81	−22.43	72.38
House prices	−5.56	5.13	−19.66	−4.34	8.97
Building permits/population	−28.76	17.59	−132.29	−26.88	100.68
Employment/population	−2.79	1.58	−14.19	−2.74	16.42
Unemployment rate[a]	1.69	1.26	−1.07	1.63	4.70
No. of firms/population	−2.25	1.26	−10.73	−2.30	17.14
Wages per employee	2.57	1.24	−10.38	2.57	16.65
Income per capita	0.58	2.07	−13.79	0.57	17.12
Memo: Population in 2006[b]	107.29	324.89	1.28	31.28	9,737.96

NOTE: The entries in the table denote the annualized log-difference (or a simple change in the case of the unemployment rate) in the specified county-level economic indicator over the specified 3-year period. Unless noted otherwise, all variables are expressed in percent. Summary statistics of changes in county-level economic indicators are based on winsorized (P0.25/P99.75) data. All summary statistics are weighted, using county populations in year $t-4$ as weights.

[a] Percentage points.

[b] Thousands of persons (not weighted).

B Credit Supply Effects and Small Business Lending

This appendix conducts the same analysis as section 5 but instead of home mortgage lending considers small business loan originations from the Community Reinvestment Act (CRA). The analysis thus corresponds most closely to Greenstone et al. (2015).

TABLE A-3 – Supply and Demand Effects and Small Business Lending

	Dependent Variable: $\Delta_3 \ln L^H_{k,t}$			
	2003–2006		2007–2009	
Explanatory Variables	(1)	(2)	(3)	(4)
$\hat{S}_{k,t}$	0.301***	0.132***	0.226***	0.083***
	(0.049)	(0.034)	(0.029)	(0.020)
$\hat{S}_{k,t-1}$	0.263***	0.133***	0.133***	0.137***
	(0.058)	(0.045)	(0.031)	(0.018)
$\hat{S}_{k,t-2}$	0.037	0.047	0.242***	0.138***
	(0.043)	(0.031)	(0.040)	(0.024)
$\hat{D}_{k,t}$	0.113***	0.073***	0.093***	0.071***
	(0.012)	(0.009)	(0.010)	(0.007)
$\hat{D}_{k,t-1}$	0.150***	0.088***	0.111***	0.086***
	(0.014)	(0.011)	(0.011)	(0.008)
$\hat{D}_{k,t-2}$	0.094***	0.070***	0.155***	0.085***
	(0.011)	(0.010)	(0.013)	(0.008)
Pr > W_S [a]	<.001	<.001	<.001	<.001
Pr > W_D [b]	<.001	<.001	<.001	<.001
Sum: supply effects[c]	0.602***	0.313***	0.600***	0.358***
	(0.089)	(0.068)	(0.051)	(0.029)
Sum: demand effects[d]	0.357***	0.231***	0.358***	0.243***
	(0.028)	(0.022)	(0.023)	(0.014)
State fixed effects	No	Yes	No	Yes
R^2	0.480	0.630	0.467	0.665
No. of counties	2,704		2,703	

NOTE: The dependent variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of small business loan originations in county k over the specified 3-year period. The explanatory variables are the estimated county-level supply effects $\hat{S}_{k,t-h}$ and demand effects $\hat{D}_{k,t-h}$ within the specified 3-year period ($h = 0, 1, 2$). All specifications include a constant, a set of county-level controls (not reported), and are estimated by WLS using county populations in $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Wald test of null hypothesis that the coefficients on $\hat{S}_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[b] p-value for the Wald test of null hypothesis that the coefficients on $\hat{D}_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[c] Sum of coefficients on $\hat{S}_{k,t-h}$, $h = 0, 1, 2$.

[d] Sum of coefficients on $\hat{D}_{k,t-h}$, $h = 0, 1, 2$.

TABLE A-4 – Supply and Demand Effects and Small Business Lending

	Dependent Variable: $\Delta_3 \ln L^H_{k,t}$			
	2003–2006		2007–2009	
Explanatory Variables	(1)	(2)	(3)	(4)
$\hat{S}^E_{k,t}$	0.328***	0.147***	0.188***	0.064***
	(0.052)	(0.036)	(0.032)	(0.023)
$\hat{S}^E_{k,t-1}$	0.303***	0.130***	0.152***	0.150***
	(0.064)	(0.049)	(0.029)	(0.018)
$\hat{S}^E_{k,t-2}$	0.014	0.046	0.225***	0.133***
	(0.043)	(0.031)	(0.038)	(0.024)
$\hat{S}^I_{k,t}$	0.168*	0.041	0.204***	0.141***
	(0.090)	(0.068)	(0.058)	(0.047)
$\hat{S}^I_{k,t-1}$	0.122	0.157**	−0.141***	0.038
	(0.089)	(0.073)	(0.052)	(0.040)
$\hat{S}^I_{k,t-2}$	0.177*	0.060	−0.020	0.106**
	(0.096)	(0.080)	(0.069)	(0.045)
$\hat{D}_{k,t}$	0.110***	0.072***	0.087***	0.072***
	(0.012)	(0.009)	(0.010)	(0.007)
$\hat{D}_{k,t-1}$	0.149***	0.088***	0.105***	0.085***
	(0.014)	(0.011)	(0.010)	(0.008)
$\hat{D}_{k,t-2}$	0.095***	0.071***	0.148***	0.084***
	(0.011)	(0.010)	(0.012)	(0.008)
$\Pr > W_{S/E}$ [a]	<.001	<.001	<.001	<.001
$\Pr > W_{S/I}$ [b]	0.071	0.195	<.001	0.002
$\Pr > W_D$ [c]	<.001	<.001	<.001	<.001
Sum: supply effects – extensive [d]	0.645***	0.323***	0.565***	0.347***
	(0.090)	(0.067)	(0.044)	(0.030)
Sum: supply effects – intensive [e]	0.467**	0.258*	0.043	0.285***
	(0.180)	(0.149)	(0.118)	(0.082)
Sum: demand effects [f]	0.354***	0.230***	0.340***	0.240***
	(0.027)	(0.022)	(0.021)	(0.015)
State fixed effects	No	Yes	No	Yes
R^2	0.484	0.631	0.486	0.667
No. of counties	2,704		2,703	

NOTE: The dependent variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of small business loan originations in county k over the specified 3-year period. The explanatory variables are the estimated county-level supply effects at the extensive margin $\hat{S}^E_{k,t-h}$, supply effects at the intensive margin $\hat{S}^I_{k,t-h}$, and demand effects $\hat{D}_{k,t-h}$ within the specified 3-year period ($h = 0, 1, 2$). All specifications include a constant, a set of county-level controls (not reported), and are estimated by WLS using county populations in $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Wald test of null hypothesis that the coefficients on $\hat{S}^E_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[b] p-value for the Wald test of null hypothesis that the coefficients on $\hat{S}^I_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[c] p-value for the Wald test of null hypothesis that the coefficients on $\hat{D}_{k,t-h}$, $h = 0, 1, 2$, are jointly equal to zero.

[d] Sum of coefficients on $\hat{S}^E_{k,t-h}$, $h = 0, 1, 2$.

[e] Sum of coefficients on $\hat{S}^I_{k,t-h}$, $h = 0, 1, 2$.

[f] Sum of coefficients on $\hat{D}_{k,t-h}$, $h = 0, 1, 2$.

TABLE A-5 – Small Business Lending and Economic Outcomes: Booms vs. Busts
(LS Regressions)

	Dependent Variable: $\Delta_3 Y_{k,t}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. *Sample period*: 2003–2006							
$\Delta_3 \ln L^H_{k,t}$	0.112***	0.717***	0.003	−0.002	−0.013**	0.020***	0.012
	(0.015)	(0.065)	(0.006)	(0.001)	(0.006)	(0.006)	(0.009)
R^2	0.877	0.357	0.182	0.654	0.402	0.353	0.428
No. of counties	2,528	2,479	2,703	2,698	2,701	2,703	2,704
B. *Sample period*: 2007–2010							
$\Delta_3 \ln L^H_{k,t}$	0.109***	0.951***	0.026***	−0.012***	0.026***	0.026***	0.049***
	(0.012)	(0.069)	(0.005)	(0.001)	(0.004)	(0.005)	(0.009)
R^2	0.877	0.404	0.495	0.793	0.581	0.187	0.554
No. of counties	2,543	2,424	2,704	2,705	2,695	2,704	2,705

NOTE: The dependent variable is $\Delta_3 Y_{k,t}$, the annualized change in an economic indicator of county k over the specified 3-year period: (1) log of (nominal) house prices; (2) log of single-family building permits to population ratio; (3) log of (private sector) employment to population ratio; (4) unemployment rate; (5) log of number of firms to population ratio; (6) log of (private-sector) wages per employee; and (7) log of personal income per capita. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of small business loan originations in county k over the same 3-year period. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted LS, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

TABLE A-6 – Small Business Lending and Economic Outcomes: Booms vs. Busts
(IV Regressions – Identification Strategy I)

	Dependent Variable: $\Delta_3 Y_{k,t}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. *Sample period*: 2003–2006							
$\Delta_3 \ln L^H_{k,t}$	0.153	−0.249	0.025	0.024	0.027	0.115	0.058
	(0.144)	(0.751)	(0.059)	(0.017)	(0.052)	(0.089)	(0.090)
Pr > CLR[a]	0.579	0.685	0.612	0.034	0.058	0.200	0.584
Pr > J[b]	0.367	0.742	0.210	0.633	0.011	0.060	0.700
No. of counties	2,528	2,479	2,703	2,698	2,701	2,703	2,704
B. *Sample period*: 2007–2010							
$\Delta_3 \ln L^H_{k,t}$	0.493***	2.175***	0.063***	−0.042***	0.047***	0.085***	0.302***
	(0.070)	(0.317)	(0.022)	(0.007)	(0.014)	(0.024)	(0.043)
Pr > CLR[a]	<.001	<.001	0.007	<.001	0.004	0.002	<.001
Pr > J[b]	0.517	0.235	0.822	0.096	0.269	0.907	0.937
No. of counties	2,543	2,423	2,702	2,703	2,694	2,702	2,703

NOTE: The dependent variable is $\Delta_3 Y_{k,t}$, the annualized change in an economic indicator of county k over the specified 3-year period: (1) log of (nominal) house prices; (2) log of single-family building permits to population ratio; (3) log of (private sector) employment to population ratio; (4) unemployment rate; (5) log of number of firms to population ratio; (6) log of (private-sector) wages per employee; and (7) log of personal income per capita. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of small business loan originations in county k over the same 3-year period, which is instrumented with the estimated county-level extensive margin credit supply effects $\hat{S}^E_{k,t}$, $\hat{S}^E_{k,t-1}$, and $\hat{S}^E_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.

[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

TABLE A-7 – Small Business Lending, Initial Conditions, and Economic Outcomes: Booms vs. Busts
(IV Regressions – Identification Strategy I)

	Dependent Variable: $\Delta_3 Y_{k,t}$						
Explanatory Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
A. *Sample period*: 2003–2006							
$\Delta_3 \ln L^H_{k,t}$	0.292*	−0.116	0.032	0.026	0.011	0.114	0.054
	(0.168)	(0.731)	(0.060)	(0.017)	(0.047)	(0.088)	(0.086)
$\Delta_3 Y_{k,t-3}$	0.298***	−0.035	0.060*	−0.119**	0.117***	−0.069	−0.255***
	(0.114)	(0.059)	(0.034)	(0.049)	(0.034)	(0.048)	(0.068)
Pr > CLR[a]	0.470	0.766	0.543	0.028	0.048	0.196	0.599
Pr > J[b]	0.212	0.530	0.208	0.640	0.006	0.066	0.754
No. of counties	2,289	2,413	2,703	2,698	2,695	2,703	2,704
B. *Sample period*: 2007–2010							
$\Delta_3 \ln L^H_{k,t}$	0.453***	2.199***	0.063***	−0.035***	0.050***	0.081***	0.277***
	(0.071)	(0.318)	(0.021)	(0.006)	(0.014)	(0.024)	(0.041)
$\Delta_3 Y_{k,t-3}$	−0.214***	−0.046	0.026	−0.345***	0.055	−0.048*	−0.229***
	(0.061)	(0.049)	(0.027)	(0.051)	(0.040)	(0.029)	(0.056)
Pr > CLR[a]	<.001	<.001	0.006	<.001	0.002	0.003	<.001
Pr > J[b]	0.377	0.242	0.814	0.034	0.212	0.919	0.938
No. of counties	2,526	2,375	2,701	2,679	2,691	2,701	2,703

NOTE: The dependent variable is $\Delta_3 Y_{k,t}$, the annualized change in an economic indicator of county k over the specified 3-year period: (1) log of (nominal) house prices; (2) log of single-family building permits to population ratio; (3) log of (private sector) employment to population ratio; (4) unemployment rate; (5) log of number of firms to population ratio; (6) log of (private-sector) wages per employee; and (7) log of personal income per capita. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of small business loan originations in county k over the same 3-year period, which is instrumented with the estimated county-level extensive margin credit supply effects $\hat{S}^E_{k,t}$, $\hat{S}^E_{k,t-1}$, and $\hat{S}^E_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.

[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

TABLE A-8 – Small Business Lending and Employment by Firm Size and Age: Booms vs. Busts
(IV Regressions – Identification Strategy I)

	Dependent Variable: $\Delta_3 \ln[E/P]_{k,t}$			
	By Firm Size		By Firm Age	
Explanatory Variables	Small	Large	Young	Old
A. *Sample period*: 2003–2006				
$\Delta_3 \ln L^H_{k,t}$	0.009	0.271	0.328	0.047
	(0.080)	(0.187)	(0.235)	(0.096)
Pr > CLR[a]	0.937	0.081	0.264	0.643
Pr > J[b]	0.252	0.499	0.532	0.462
No. of counties	2,348	2,348	2,669	2,669
B. *Sample period*: 2007–2010				
$\Delta_3 \ln L^H_{k,t}$	0.138***	0.024	0.312***	0.020
	(0.029)	(0.055)	(0.095)	(0.030)
Pr > CLR[a]	<.001	0.672	0.002	0.536
Pr > J[b]	0.324	0.748	0.521	0.708
No. of counties	2,361	2,361	2,682	2,683

NOTE: The dependent variable is $\Delta_3 \ln[E/P]_{k,t}$, the annualized log-difference in the employment-population ratio by firm size and age of county k over the specified 3-year period. The explanatory variable is $\Delta_3 \ln L^H_{k,t}$, the annualized log-difference of the dollar amount of small business loan originations in county k over the same 3-year period, which is instrumented with the estimated county-level extensive margin credit supply effects $\hat{S}^E_{k,t}$, $\hat{S}^E_{k,t-1}$, and $\hat{S}^E_{k,t-2}$. All specifications include a set of county-specific control variables (not reported) and state fixed effects and are estimated by weighted GMM, using county populations in year $t-4$ as weights. Asymptotic standard errors reported in parentheses are clustered in the commuting zone dimension: * $p < .10$; ** $p < .05$; and *** $p < .01$.

[a] p-value for the Moreira (2003) weak-instrument-robust conditional likelihood ratio test of the null hypothesis that the coefficient on $\Delta_3 \ln L^H_{k,t}$ is zero.

[b] p-value for the Hansen (1982) test of the overidentifying restrictions.

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