EXPORTING LIQUIDITY:

BRANCH BANKING AND FINANCIAL INTEGRATION

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March 2013

ABSTRACT

We exploit exogenous bank deposit windfalls from oil and natural gas shale discoveries to demonstrate the importance of bank branch networks in integrating the U.S. mortgage market. Using loan level data we find that banks exposed to shale booms increase their lending in non-boom counties by 0.93% per 1% increase in deposits. This effect is present only for bank lending via local branches and is strongest for mortgages that are hard to securitize. Our findings suggest that agency and information frictions limit the ability of arm's length finance to integrate credit markets. To our knowledge, these results provide the first 'smoking gun' evidence that branch networks play an important role in financial integration, despite the development of securitization markets and advances in lending technology.

I. INTRODUCTION

Over the past thirty years the banking system in the U.S. has gone through a significant transformation by relying more on capital markets and direct finance in funding loans and less on traditional intermediation whereby banks hold loans on their balance sheet. The U.S. mortgage market has been at the forefront of this transformation, with 52% of mortgages in 2011 financed by securitization markets, up from 12% in 1980. Moreover, changes in lending technology facilitated banks' lending well outside of their branch-based geographical domains (see, e.g., Loutskina and Strahan (2011)). These changes have integrated local credit markets and allowed capital to flow more freely across markets. The growing role of external capital markets should have diminished the value of bank branch networks. Yet, the extent and density of bank offices and branches has grown significantly, from 63,000 in 1990 to 89,500 in 2011.[1] In this paper, we exploit exogenous bank deposit windfalls from oil and natural gas shale discoveries ("booms") to demonstrate the continued importance of bank branch networks in integrating the U.S. mortgage market.

Using detailed loan level data, we find that banks exposed to shale boom deposit windfalls increase their lending in non-boom counties by 0.93% per 1% increase in deposits. However, banks export this liquidity only to markets where they have a branch presence; the effects are also stronger for loans retained rather than sold or securitized. These results suggest that the extension of branch networks facilitates the flow of capital for information-intensive loans, where the impact of external capital markets and new lending technology has been limited by agency and information frictions. To our knowledge, these results provide the first 'smoking

[1] See http://www2.fdic.gov/hsob/HSOBRpt.asp.

gun' evidence that branch networks play an important role in financial integration, despite the development of securitization markets and advances in lending technology.

Our analysis is based on a unique exogenous positive shock to bank liquidity. We use large-scale yet unexpected deposit windfalls in counties that experience natural gas shale booms. To develop shale reserves, oil and gas companies make sizable cash payments to individual mineral owners, which result in an increase in bank deposits in the areas with shale activity (Gilje, 2011 and Plosser, 2011). Prospecting and development for shale has resulted in 1,280 banks receiving deposit windfalls in different years between 2003 and 2010 as new discoveries were made. We test how this expansion of liquidity affected lending by banks in counties not directly affected by the booms but which are connected to the shale-boom counties via branch networks. Our identification rests on the idea that a bank's exposure to a shale discovery is exogenous. This assumption seems plausible because shale discoveries came unexpectedly, and because deposits flowed to branches fortunate enough to be located in a shale-boom county (Gilje, 2011). By studying lending activity *outside* of shale-boom counties, we alleviate concerns that lending behavior is being driven by direct effects of shale discoveries on credit demand.

We test how this liquidity shock affects mortgage lending, where funding from external capital markets through securitization has grown most rapidly in importance. We study this market because loans have a clear geographical dimension pinned down by the property location, which is not possible for other types of loans. Our unit of analysis is the bank-county-year, which is possible because mortgage origination data contain information on both the identity of the lender as well as the location of the property being financed. With this rich data structure, we saturate our models with county*year fixed effects, thus removing demand variation that could affect credit growth. Conceptually, our regressions compare mortgage growth rates for two otherwise similar banks for properties located in the same county-year, one bank having branches in a shale-boom county (and thus getting a positive external liquidity shock) and the other having no branches in shale-boom counties. Our approach is built on the assumption that the consumer home credit demand shocks are homogenous within a county.

Armed with a powerful exogenous shock to bank deposits, we estimate the elasticity of mortgage lending to deposit growth in the IV setting. We find that a one percent increase in deposits, a measure of the availability of funds, results in 0.93% increase in mortgage originations. More importantly, the estimated elasticity of lending growth to deposit growth is much larger for retained mortgages (2.27%) where banks' liquidity should matter. We find no effect of deposit growth on sold mortgages where liquidity should not matter, since funding comes from national capital markets. This difference illustrates the importance of isolating liquidity supply shocks particularly given that OLS produces almost identical estimates of deposit growth effects on mortgage originations, irrespective of whether those mortgages are held by the originating bank or sold to a third party. The OLS setting combines the effects of both liquidity supply shocks with credit demand shocks, as banks will alter their deposit levels and other sources of funding in response to changes in credit demand. In contrast, the IV approach isolates the liquidity supply channel.

After establishing the elasticity of bank lending relative to its availability of funds, we analyze how banks export liquidity. To simplify the empirical set-up, we focus on reduced form models linking liquidity windfalls directly to lending in non-boom counties. The reduced form approach allows us to test for interaction effects that would be difficult to estimate in the IV setting. Mortgage lending increases in outlying (non-boom) areas for banks experiencing deposits windfalls, but *only* when such banks have branches in *both* markets; lenders experiencing deposit inflows do not lend more in areas where they have no branch presence. We also find that the deposit windfalls expand lending only in segments of the market less likely to be securitized, such as home equity lines (sold or securitized 4.5% of the time) and home-purchase mortgage (sold or securitized 46% of the time), as opposed to mortgage re-financings (sold or securitized 65% of the time).

Our evidence suggests that branch networks help integrate portions of the mortgage market where frictions limit the impact of arm's length finance.[2] Lenders with a branch presence possess private information about borrowers and their property values and thus are better positioned to price risk and originate loans. In addition, local lenders may be better able to monitor loans over time and optimally work out or foreclose in downturns (Cortes, 2011). Local knowledge that is private to originators, however, inhibits arm's length financing, partly because of adverse selection (i.e. the seller knows more than buyer) and partly because of moral hazard (i.e. the informed lender needs to keep sufficient skin in the game to maintain monitoring incentives). Consistent with this notion, Loutskina and Strahan (2011) find that local lenders retain about 55% of the mortgages that they originate, whereas large multi-market lenders retain only about 30% of their originations. Thus, when local lenders receive liquidity windfalls, internal financing constraints loosen and they supply more credit. The marginal borrowers funded by the "shale-boom" deposits presumably would not have been served otherwise because the local lenders making the loans have limited access to capital markets and because the loans themselves are retained by the originating lenders.

[2] Houston, James and Marcus (1997) document the workings of capital markets internal to multi-bank holding companies. Lamont (1997) uses a similar strategy in a non-financial context. Campello (2002) finds that internal capital markets insulate small banks from the impact of monetary policy shocks.

Could the liquidity windfalls be financing bad loans, as managers waste the unexpected funds on pet projects, as in Jensen (1986)? This explanation is hard to rule out completely because our data do not allow us to track loan outcomes. Instead, we show that local banks export more funds to markets with strong un-served loan demand (where lagged acceptance rates were high), and that local banks that are constrained by regulatory capital expand lending less than other banks in respond to the liquidity windfalls. These results are consistent with the idea that the new loans are profitable.

The results contribute to two strands of the literature. First, we offer a novel identification strategy to test whether bank liquidity shocks affect credit supply.[3] The extant literature offers different empirical designs to avoid confounding variables like credit demand or unobserved productivity shocks. For example, Gertler and Gilchrist (1994), Kashyap et. al. (1994), Kashyap, Stein (2000), Campello (2002) and Loutskina (2011) exploit cross-sectional differences in bank's lending responses to aggregate liquidity shocks such as monetary policy. Others exploit natural experiments, where external shocks from abroad propagate into domestic credit markets through cross-border ownership of banks or bank branches (e.g. Peek and Rosengren (1997), Schnabl (2012), Cetorelli and Goldberg (2012)). Some studies focus on how local shocks like bank failures, government interventions or bank runs affect lending (e.g. Ashcraft, 2006, Khwaja and Mian, 2008, Paravisini, 2008, Iyer and Peydro, 2011). Ours is closest to these papers, but differs because we can locate both the lender (based on branch presence) and the borrower (based on the location of the property). We show that even in the most developed, integrated, and technologically advanced lending market (the U.S. mortgage market), local branching networks, and by extension local knowledge, remain important. The

[3] See the theoretical arguments in, e.g., Bernanke and Blinder (1988), Holmstrom and Tirole (1997), and Stein (1998).

results imply that information production is still important for some segments of this market, and implies that capital markets and arm's length finance cannot serve all segments of the credit markets.

Second, our study extends existing research on financial integration of the U.S. market and helps explain why such large benefits followed intrastate branching and interstate banking deregulation.[4] Two mechanisms, potentially working in parallel, can explain these benefits. First, tougher competition post-deregulation led to more efficient banking, lowered the cost of capital for non-financial firms (lower loan rates) and better allocation of resources. Consistent with this mechanism, deregulation was followed by a reallocation of assets from less-efficient banks to more-efficient ones (Stiroh and Strahan, 2003); loan losses declined (Jayaratne and Strahan, 1996); and, interest rates on loans to small businesses fell (Rice and Strahan, 2010). The second mechanism, improved capital mobility across markets after reform, allows savings in areas with a relative dearth of good projects to finance investment in areas with higher-return projects. In this paper, we provide the first direct evidence for this second mechanism by tracing out the effects of a sharply defined local positive liquidity shock on credit supply in outlying areas connected via branch networks.

In the remainder of the paper, Section II describes briefly the shale booms and their effects on local banks. Section III reports our data, empirical methods and results. Section IV contains a brief conclusion.

[4] The intrastate branching deregulation led to faster growth of the state economies (Jayaratne and Strahan (1996)) and lower growth volatility (Morgan, Rime and Strahan (2004)). Such deregulation came with better quality lending (Jayaratne and Strahan, 1996), more entrepreneurship and a greater share of small establishments (Black and Strahan 2002; Cetorelli and Strahan, 2006, Kerr and Nanda, 2009), lower income inequality, less labor-market discrimination and weaker labor unions (Black and Strahan, 2001; Beck et al, 2010; Levkov, 2012).

II. SHALE BOOMS

In 2003, a technological breakthrough which combined horizontal drilling with hydraulic fracturing ("fracking") enabled vast amounts of natural gas shale to become economically profitable to develop. Subsequent prospecting activity led to the development of a new energy resource equivalent to 42 years of U.S. motor gasoline consumption. As recently as the late 1990s, these reserves were not thought to be economically profitable to develop, and represented less than 1% of U.S. natural gas production. However, breakthroughs in the development of the Barnett Shale in and around Fort Worth, TX in 2003, changed industry notions on the viability of natural gas shale.

In the early 1980s Mitchell Energy drilled the first well in the Barnett Shale (Yergin (2011)). However, rather than encountering the highly porous rock of a conventional formation, Mitchell encountered natural gas shale. Shale holds vast amounts of natural gas; however, it is highly non-porous which causes the gas to be trapped in the rock. Over a period of 20 years Mitchell Energy experimented with different techniques, by the early 2000s it found that by hydraulic fracturing (commonly referred to as "fracking") it was able to break apart shale to free natural gas. With higher natural gas prices and the combination of horizontal drilling with "fracking," large new reserves from shale became economically profitable to produce.

The size of this energy resource, combined with the low risk of unproductive wells ("dry-holes"), has led to a land grab for mineral leases. Before commencing drilling operations, oil and gas firms must negotiate with mineral owners to lease the land that is being drilled on. Typically these contracts are comprised of a large upfront "bonus" payment, which is paid whether the well is productive or not, and a royalty percentage based on the value of the gas produced over time. As an example, the New Orleans' Times-Picayune (2008) reported lease bonus payments of $10,000 to $30,000 an acre plus a 25% royalty in the Haynesville Shale area. An individual who owns one square mile of land (640 acres) and leases out his minerals at $10,000/acre would receive an upfront one-time payment of $6.4 million plus a monthly payment equal to 25% of the value of all the gas produced on his lease.

The significant personal wealth windfalls people have experienced in the areas of natural gas shale discoveries has led to large increases in local bank deposits. In an interview with the Houston Chronicle (2012), H.B. "Trip" Ruckman III, president of a bank in the Eagle Ford shale, stated "We have had depositors come in with more than a million dollars at a whack." The deposit windfalls experienced by banks with branches in boom counties are exogenous to the underlying characteristics of the affected communities (health, education, demographics etc). The exogenous factors driving shale development include technological breakthroughs (horizontal drilling/hydraulic fracturing) and larger macroeconomic forces (demand for natural gas and natural gas prices). The exogenous nature of bank shale deposit windfalls makes these events an attractive setting to study the role of branch networks in propagating liquidity shocks. Since the first major shale discovery in the Barnett (TX), additional discoveries have occurred in the Woodford (OK), Fayetteville (AR), Haynesville (LA + TX), Marcellus (PA + WV), Bakken (ND), and Eagle Ford (TX).

III. DATA, METHODS AND RESULTS

We want to test whether the bank deposit windfalls from oil and natural gas shale discoveries affected mortgage supply. Absent some frictions, changes in deposits in local areas should not change lending supply; lenders would always make all profitable loans. Lenders could finance the marginal loan either by borrowing in capital markets or by selling or securitizing to other investors. Alternatively, home buyers themselves would be able to borrow from lenders anywhere, thus making the local pool of savings irrelevant to credit conditions. Bank branches, in such a frictionless world, would exist solely to provide convenience to depositors but would have no impact on credit availability.

In contrast, if branches give lenders information about local market conditions, borrower income or income prospects, or allow them to monitor distressed properties better, then local finance can affect mortgage credit supply. Integration through access to securities markets or the interbank lending market will tend to limit the role of local deposits for large banks, but such markets are not available (or are expensive) to most small and medium-sized non-public banks. Securitization also will be limited for loans made by lenders with a clear informational advantage over potential buyers. Thus, we design our tests to focus on the roles of local knowledge (proxied by the lender's branch proximity to the borrower) and securitization (based on actual decisions to retain loans and also on ex ante measures of the likelihood of securitizing) in explaining the importance of local liquidity shocks on credit supply.

<u>Data</u>

We build our sample at the bank-county-year level, starting with all counties in the seven states that experienced shale booms and all banks originating mortgages in those areas (both with and without branches in a given county). The states included are: Arkansas, Louisiana, North Dakota, Oklahoma, Pennsylvania, Texas and West Virginia. As Figure 1 shows (map), each state contains a large number of counties that experienced shale booms as well as a large number of non-boom counties. Across the seven states, 124 counties experienced booms and 515 did not. We drop all non-bank lenders because most of them fund mortgage lending with securitization and are thus not affected by local liquidity shocks. The sample begins in 2000 (three years before the first shale boom), and ends in 2010.

Using the *Summary of Deposits* from the Federal Insurance Deposit Corporation (FDIC), we determine the number of branches and amount of deposits held for each bank in each county-year from the seven states.[5] These data allow us to build two alternative measures of exposure to the shale-boom shock. The first - *Share of branches in boom counties* - equals the fraction of branches owned by each bank that are located in a shale-boom county. This variable equals zero for all bank-county-years prior to 2003, the year of the first shale investment; after 2003, the variable increases within bank-county over time as more counties experience booms. The variable ranges from zero (for banks without branches in boom counties, or for banks with branches in boom counties during the years prior to the boom's onset) to one (for banks with all of their branches in boom counties after the onset of the booms).

Our second measure accounts for both the distribution of branches across counties as well as the size of the shale investments (as a proxy for the amount of money being deposited into local branches). This measure - *Total exposure to shale booms* - equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. This measure is harder to interpret than the *Share of branches in boom counties* - it need not vary between zero and one - but it accounts for differences in the relative size of the booms.

Our models focus on the effect of exposure to the shale boom on mortgage credit growth, but we include other bank characteristics as control variables, each measured from the end of the

[5] http://www2.fdic.gov/sod/.

prior year. These variables include the following: Log of $Assets_{t-1}$; $Deposits/Assets_{t-1}$; Cost of $Deposits_{t-1}$ (=Interest expenses on deposits / total deposits); Liquid assets / $Assets_{t-1}$; Capital / $Assets_{t-1}$ (=Tier 1 capital/ assets); C&I loans / $Asset_{t-1}$; Mortgage loans / $Assets_{t-1}$; Net income / $Assets_{t-1}$; Loan Commitments / $Assets_{t-1}$; and, Letters of Credits /$Assets_{t-1}$. Data for bank control variables come from year-end Call Reports.

Table 1 reports summary statistics for *Share of branches in boom counties* and *Total exposure to shale booms* (Panel A), as well as the lagged bank characteristics (Panel B), separated by whether or not the bank has any exposure to a shale-boom county. Table 1 shows that exposed banks tend to be larger than non-exposed banks and that their deposits grow faster, consistent with the notion that exposure to the shell wells boom leads to strong deposits inflows. The marked difference in asset size (log of assets) is a potential concern in our models because large banks differ in many ways from smaller ones, so we will report robustness tests in which we filter out larger banks with several alternative approaches.

To measure mortgage activity, we utilize the detailed data on mortgage applications collected annually under the *Home Mortgage Disclosure Act* (HMDA). Whether a lender is covered depends on its size, the extent of its activity in a Central Business Statistical Area (CBSA), and the weight of residential mortgage lending in its portfolio.[6] The HMDA data include loan size, whether or not a loan was accepted, as well as some information on borrower credit characteristics. Using HMDA data, we measure mortgage origination growth by bank-

[6] Any depository institution with a home office or branch in a CBSA must report HMDA data if it has made a home purchase loan on a one-to-four unit dwelling or has refinanced a home purchase loan and if it has assets above $30 million. Any non-depository institution with at least ten percent of its loan portfolio composed of home purchase loans must also report HMDA data if it has assets exceeding $10 million. Consequently, HMDA data does not capture lending activity of small or rural originators. U.S. Census shows that about 83 percent of the population lived in metropolitan areas over our sample period and hence the bulk of residential mortgage lending activity is likely to be reported under the HMDA.

county-year. HMDA reports both the identity of the lender as well as the location of the property down to the ZIP code level. These are the only comprehensive data on lending by US banks that allow researchers to locate borrowers geographically. (In principle, we would want to test for similar effects on other kinds of loan growth, especially loans to small businesses.) HMDA also contains information of the purpose of the loan (mortgage purchase loans, home-equity loans, and mortgage re-financings) and whether the lender expects to sell or securitize the loan within one year of origination. We use these data to test whether loans easier to finance in securitization markets respond less to the local liquidity shocks following shale booms.

Panel C of Table 1 reports summary statistics for the mortgage growth rates. For the average exposed bank, mortgages grow 11.7% per year, compared to 11.2% for banks not exposed. This difference is larger for retained mortgage growth, which averages 9.1% per year for exposed banks, compared to 7.7% for non-exposed banks. These raw differences could be attributed to both the liquidity windfalls and the economic growth of the booming counties. We will isolate these two effects in our later analysis. Note that the standard deviation in the mortgage growth rates is very high relative to the mean, but most of this variation reflects time-series fluctuations stemming from changes in interest rates (which alter re-financing rates drastically) as well as variation around the housing boom (2004-2006) and bust (2006-2010) periods, which our data straddle.

HMDA also contains some simple data on borrower characteristics, which we use to build the following averages for all loans originated at the bank-county-year level: borrower and area income, loan size-to-borrower-income ratio, percent women and percent minority, and percent minority in the area for loans. In all of our models we control for the contemporaneous mean of each of these borrower attributes across all loan originations in a given bank-county-year.

Methods and Results

Instrumental Variable Analysis

To test how variation in deposits affects mortgage growth, we estimate the following relationship:

$$Mortgage\text{-}growth_{i,j,t} = \alpha_{j,t} + \beta Deposit\text{-}growth_{i,t} + Borrower\ and\ Lender\ Controls + \varepsilon_{i,j,t}\ , \qquad (1)$$

where i indexes lenders, j indexes counties, and t indexes years. We also consistently include county*year fixed effects ($\alpha_{j,t}$) in all of our regressions. These fixed effects remove time-varying, county-level shocks related to business cycles, industry composition, housing demand, etc. By saturating the model, we remove lending growth within a county-year due to forces beyond the liquidity shock (such as credit demand due to economic growth). To further separate the liquidity supply shock from the potentially confounding demand shock, we include in our sample *only* counties that *did not* experience a shale boom.

To identify the effects of liquidity supply shocks, we build an instrumental variable for deposit growth using *Share of branches in boom counties* as the identifying instrument. (Similar results go through if we instead use *Total exposure to shale booms* as the identifying instrument for deposit growth.) Unlike the dependent variable, the measures of deposit growth, as well as the instruments, do not vary across counties for a given bank-year. There could be common, time-invariant bank-level components to the error term. Hence, we build standard error by clustering by bank throughout all of our results.

We first model total mortgage growth as dependent variable, and then we decompose *Mortgage-growth*$_{i,j,t}$ into the growth of retained mortgages and the growth in sold or securitized mortgages for a few reasons. The liquidity shock should first and foremost affect bank's ability to retain loans. The ability of the capital markets to absorb securitized loans should not be affected, but bank willingness to supply such loans to the secondary market might change with their financial conditions. By decomposing the total loan volume we can evaluate whether liquidity shock leads banks to retain more loans at the expense of the secondary market.

Table 2 reports the IV and OLS results. Column (1) contains first-stage results. As expected, deposits grow faster at banks with a greater fraction of branches in shale-boom counties. The instrument has a t-statistic of 1.97; it passes the Kleibergen-Paap weak identification test and the Anderson-Rubin Chi-square and F-tests for significance of endogenous regressors. Since the model is just identified, we cannot report over-identification tests.

Columns (2), (4) and (6) report the OLS versions of equation (1) above, and the other odd-numbered columns report the corresponding IV estimate for comparison. The OLS coefficients are positive and significant with very similar magnitudes, ranging from about 0.4 to 0.6, across all three mortgage-growth variables. When we isolate the liquidity supply-shock channel, we observe significantly different elasticities across the three loan growth categories. We observe that the liquidity shock increases lending activity, with a one percent increase in bank deposits leading to a 0.93 percent growth in loan origination. This effect comes mostly from banks originating and retaining more loans. Surprisingly, the liquidity shock is not associated with banks securitizing less. The coefficient suggests that a one percent increase in deposit growth (from an external liquidity supply shock) causes a 2.3 percent increase in the growth of retained mortgages. An elasticity above one implies that other portions of the bank's balance sheet, such as investments in securities or other liquid assets, are not affected or even decline when deposit supply expands. Investments in liquid assets, for example, may decline in response to the shale-boom windfalls, although we have no clean way to identify this relationship because such investments have no geographical component. Overall, these patterns are exactly what one would expect because sold loans (as well as investments in securities) can be financed in securitization markets, which tap sources of capital in national (and even international) markets.

The bank-year level control variables in Table 2 have relatively little explanatory power in these regressions. Moreover, the results of interest are insensitive to the exclusion of these variables (not reported). This suggests that unobserved bank characteristics are unlikely to be able to explain our key results.

Reduced Form Approach

We have established that lending growth responds positively to liquidity windfalls from another market. Our goal next is to understand exactly how the liquidity is exported to other market, which lenders and which loan types are most affected by liquidity shocks. We want to introduce a series of interaction terms with the liquidity shock measure. To simplify the empirical set-up in the remainder of our tests, we focus on reduced form models linking a bank's liquidity windfall from shale-boom exposure to its lending in non-shale counties. The reduced form approach allows us to test for interaction effects that would be difficult to estimate in the IV setting. As a first step we present the reduced form models that correspond to our instrumental variable analysis results and evaluate the robustness of our core results.

$$\textit{Mortgage-growth}_{i,j,t} = \alpha_{j,t} + \beta \textit{Share of branches in boom counties}_{i,t} + \textit{Borrower and Lender Controls} + \varepsilon_{i,j,t} \quad (2a)$$

and

$$\textit{Mortgage-growth}_{i,j,t} = \alpha_{j,t} + \beta \textit{Total exposure to shale boom counties}_{i,t} + \textit{Borrower and Lender Controls} + \varepsilon_{i,j,t}\ . \quad (2b)$$

Equations (2a) and (2b) allow us to infer the total effect of the shale-boom shock on lending growth without taking a stand on whether the effect works through higher growth in deposits or perhaps other sources of funds such as early re-payment of existing loans by borrowers in shale-boom counties. After establishing these baseline models, we then introduce interaction terms with *Share of branches in boom counties* and *Total exposure to shale boom counties* to understand where the liquidity effects are greatest.

Table 3 reports the simple reduced form models with the same structure as the OLS v. IV models reported in Table 2. Consistent with the earlier result, we find a significant positive impact of exposure to the shale-booms through branch connections for both total mortgage growth (columns 1 & 2) and for growth of retained mortgages (columns 3 & 4), but no significant impact for sold-loan growth (columns 5 & 6). For retained mortgages, a typical exposed bank (e.g. one with about 45% of its branches in a shale-boom county – recall Table 1) would grow its retained-mortgage portfolio 14 percentage points (=0.45*0.325) faster in the non-boom counties than a similar bank would in that county that did not have exposure to the shale-boom liquidity windfall (based on the coefficient of interest in column 3). Similar to Table 2, the bank-year level control variables have relatively little explanatory power and the results of interest are insensitive to the exclusion of these variables.

Table 4 reports robustness tests for our baseline reduced form model. First, we estimate equations (2a) and (2b) without lenders that have a very small percentage of their total business in a given county-year (< 2.5% of their total mortgage originations). This filter removes the large, nationwide banks that are unlikely to be affected in a significant way by local variation in deposits. In fact, when we impose this filter, the average asset size for exposed vs. unexposed banks becomes very close ($400 vs. $465 million), as opposed to the unfiltered data (recall Table 1). These results appear in the first two columns of Table 4. The coefficients on both *Share of branches in boom counties* and *Total exposure to shale boom counties* increase in magnitude and statistical significance when we impose this filter (0.17 v. 0.15 in column 1; 0.06 v. 0.05 in column 2).

Second, we estimate equations (2a) and (2b) after dropping bank-county-years where the mortgage growth rate is based on fewer than 15 loans during the prior year (columns 3 & 4). This filter drops observations likely to have substantial noise in the dependent variable. Again, the results are more significant than before, both in terms of magnitudes as well as statistical significance. Note that in Table 4 and hereafter, we focus on overall mortgage origination, although as we have seen the effects are driven by variation in retained (as opposed to sold) mortgage growth. We do this because the decision of whether or not to hold a mortgage at the margin depends on a bank's funding cost, which varies with exposure to the shale booms. Thus, focusing on total origination growth helps determine whether or not overall lending supply is affected (as opposed to merely whether banks finance their lending on balance sheet or through loans sales/securitization).

Local v. Distant Lenders

As noted earlier, previous research suggests that mortgage lenders with branches near their borrowers have an advantage in collecting information and monitoring borrowers that may experience distress. Since loans where lenders possess private information are harder to fund externally (such as through securitization markets), we expect local lenders (those with branches in the same county as the borrower) to respond more to the liquidity windfalls than non-local lenders. In fact, if non-local lenders have no information advantage relative to other lenders – for example, if their lending decisions depend only on public information such as borrower FICO scores and mortgage loan-to-value ratios, then we would expect changes in local funding to have no impact on their credit supply decisions.

To test this idea, we introduce an interaction to the reduced form models based on whether or not the bank has a branch located near the borrower, as follows:

$$\begin{aligned}&\textit{Mortgage-growth}_{i,j,t} = \alpha_{j,t} + \beta_1 \textit{Local Lender}_{i,t} + \beta_2 \textit{Share of branches in boom counties}_{i,t} + \\ &\beta_3 \textit{Local lender}_{i,t} \textit{*Share of branches in boom counties}_{i,t} \qquad (3a)\\ &+\textit{Borrower, Lender Controls} + \varepsilon_{i,j,t}\end{aligned}$$

and

$$\begin{aligned}&\textit{Mortgage-growth}_{i,j,t} = \alpha_{j,t} + \beta_1 \textit{Local Lender}_{i,t} + \beta_{2i,t} \textit{Total exposure to shale boom} \\ &\textit{counties} + \beta_3 \textit{Local lender}_{i,t} \textit{*Total exposure to shale boom counties}_{i,t} \qquad (3b)\\ &+ \textit{Borrower, Lender Controls} + \varepsilon_{i,j,t}\ .\end{aligned}$$

In (3a) and (3b), *Local Lender*$_{i,t}$ equals one if a lender has at least one branch in county-year *i,t* and zero otherwise. Table 5 reports these results. Columns 1 & 2 report results using all lenders, and includes the interaction term to identify β_3. Columns 3 & 4 report the model without the interaction term for just the local-lender sample of bank-county-years.

We find mortgage growth increases for banks exposed to shale-boom liquidity windfalls, but *only* for local banks - those with branches in the same county as the property being financed. The interaction term is positive and significant (columns 1 & 2), and the overall impact on local banks is itself significant (columns 3 & 4). The direct effect of the liquidity windfall variable, however, is not significant (columns 1 & 2), meaning that lending for non-local banks does not change. Comparing the typical local bank with exposure (*Share of branches in boom counties* = 0.45, recall Table 1) to a local bank without exposure (*Share of branches in boom counties* = 0), mortgage lending would grow 10 percentage points faster (=0.45*0.23, based on column 3) at the exposed bank. There is no evidence that non-local lenders supply more credit when they are exposed to the shale-boom windfalls (i.e. neither the direct effect of *Share of branches in boom counties* nor *Total exposure to shale boom counties* is significantly different from zero). Table 5 thus establishes that local liquidity windfalls stimulate lending only for local banks.

Lending in Boom Counties

So far we have focused on external spillovers to non-boom counties. But how do banks respond to liquidity shocks in the boom counties themselves? If the liquidity windfalls are large, then all banks ought to be able to fully exploit profitable lending opportunities within the boom counties; thus, mortgage lending growth in the boom counties should not vary as a bank's access to external (non-boom) counties changes.

To test this idea, we add the boom counties to our panel and include interaction terms to allow the effects of *Share of branches in boom counties* and *Total exposure to shale boom* *counties* to vary depending on whether a county itself is experiencing a shale boom. Thus, we estimate the following:

$$Mortgage\text{-}growth_{i,j,t} = \alpha_{j,t} + \beta_1 Share\ of\ branches\ in\ boom\ counties_{i,t} + \beta_2 Boom\text{-}County_{i,t} * Share\ branches\ in\ boom\ counties_{i,t} + Borrower,\ Lender\ Controls + \varepsilon_{i,j,t}\ , \quad (4a)$$

and

$$Mortgage\text{-}growth_{i,j,t} = \alpha_{j,t} + \beta^1 Total\ exposure\ to\ shale\ boom\ counties_{i,t} + \beta^2 Boom\text{-}County_{i,t} * Total\ exp.\ to\ shale\ counties_{i,t} + Borrower,\ Lender\ Controls + \varepsilon_{i,j,t}\ . \quad (4b)$$

For these tests, we include only local banks, since we have documented that only they adjust their lending in response to the liquidity shock. Note that the direct effect of $Boom\text{-}County_{i,t}$ is absorbed by the county-year effects.

Table 6 reports the results. They are striking. We find no significant link from the extent of connections to external markets and mortgage growth within the boom counties – all banks in these counties behave similarly with respect to local loan growth; for example, in column (1) the sum of the coefficient on *Share of branches in boom counties* and the coefficient on its interaction with the *Boom-county indicator* is approximately zero. Since all banks in boom counties are flush with liquidity, they can fully exhaust their profitable loans there. Behavior differs dramatically across banks, however, in the non-boom markets (since in non-boom counties only some banks receive the liquidity windfall). An increase in exposure to the liquidity shock increases lending in these markets – financially integrated banks export capital from the boom county to support profitable lending opportunities that other banks in those counties may not be able to exploit (because they do not receive the liquidity windfall); hence, banks connected to boom counties lend more in non-boom counties. The effects estimated here are economically similar to those reported earlier for regressions that included just the non-boom counties; these results are reproduced in Table 6, columns 3 & 4 for comparison.

Mortgage growth by loan purpose

We have shown that local banks with liquidity windfalls export the funds to outlying markets leading to faster mortgage growth, and that the faster growth is concentrated among retained mortgages (recall Table 3). Retained mortgage growth, however, combines two sources of variation: 1) increases in mortgages to borrowers where securitization is not available (because lenders possess private information); 2) a greater tendency of lenders to hold mortgages that could be securitized (but aren't due to the new low-cost deposits). We want to isolate the first source of variation, to the extent possible, because these are loans that would not have been made but for the liquidity windfalls. Thus, we split the mortgage data into three segments based on the average rates of securitization. We expect a greater impact of liquidity windfalls on loans with lower ex ante access to securitization markets.

Table 7 re-estimates equations (2a) and (2b), focusing only on the sample of local lenders operating in non-boom counties, but splits the mortgage growth rate by loan purpose: mortgages for home purchase, home-equity loans (second liens), and mortgage re-financings. Home equity loans are much less likely to be funded in securitization markets than the other two loan types (only 4.5% of the home equity loans were securitized in our sample period). Hence, local liquidity shocks should matter more for this category than the other two categories.

Table 7 reports only the coefficient of interest, but the specification includes the same set of borrower and lender controls and county*year fixed effects as the previous set of results. As expected, we find that the effects of the liquidity windfalls are concentrated among loans more likely to be held by originators – mortgages for purchase or home equity loans, as opposed to mortgages for re-financing. The coefficient differences are statistically significant between home-purchase mortgages and re-financings, and between home-equity loans and re-financings, but not between home-purchase and home-equity loans. And, the effect of the liquidity shock on growth in mortgage re-financings is not statistically significantly different from zero itself.

Table 8 reports similar models to those in Table 7, but we add back the non-local lenders to the sample, and thus also include both the direct effect of the liquidity variables plus their interactions with the local-lender indicator. As in Table 7, the other variables are included in the regression but not reported in the table. We find, consistent with the earlier analysis, that only local lenders respond to the liquidity windfalls, and that their response is evident only among loans likely to be financed on balance sheet – mortgages for home purchase and second mortgages, but not mortgages for re-financing. In these specifications, the effects of the liquidity windfall are largest for the home-equity segment (hardest to securitize), intermediate for mortgages for home purchase, and zero for the re-financing segment (easiest to securitize).

Is New Mortgage Lending a Free-Cash Flow Agency Problem?

Our results suggest that portions of the mortgage market where local knowledge limits the impact of securitization and arm's length finance respond to local liquidity shocks. This increase, however, could reflect lender agency problems (Jensen, 1986), whereby unexpected cash flow shocks lead to over-investment. This explanation is hard to rule out fully because we are not able to follow loan outcomes at the bank-county-year level. Instead, we test whether the mortgage growth effects are greatest in markets with high un-served demand, and whether the effects are greatest among lenders who themselves were less constrained by regulatory capital before the advent of the shock. If credit supply expands rationally to finance good projects (opposed to managers' pet projects), we would expect a greater response in counties with more ex ante demand for credit. Similarly, under that agency interpretation, banks with high capital buffers ought to respond less to the liquidity inflows because they could have financed loans even without the liquidity inflow. If credit expands rationally, in contrast, banks with high ex ante capital can deploy their low-cost deposits to make more new loans, whereas more constrained banks would more quickly face binding regulatory capital constraints.

Mian and Sufi (2009) argue that the advent of subprime credit had its greatest impact on neighborhoods with unmet demand for mortgage credit, based on the mean mortgage acceptance rate in the area at the beginning of their sample. Their analysis suggests that such areas experienced stronger growth in credit and housing prices, and then larger crashes after 2006. We apply their strategy to our setting by inter-acting our measure of external liquidity windfalls with the average mortgage acceptance rate from all mortgage applications made during the prior bank-county-year ($Acceptance\ Rate_{i,j,t-1}$), as follows:

$$\begin{aligned}&Mortgage\text{-}growth_{i,j,t} = \alpha_{j,t} + \beta^{1} Share\ of\ branches\ in\ boom\ counties_{i,t} + \\&\beta^{2} Acceptance\ Rate_{i,j,t-1} {*} Share\ of\ branches\ in\ boom\ counties_{i,t} + \\&\beta^{3} Acceptance\ Rate_{i,j,t-1} + Borrower,\ Lender\ Controls + \varepsilon_{i,j,t}\ ,\end{aligned} \tag{5a}$$

and

$$\begin{aligned}&Mortgage\text{-}growth_{i,j,t} = \alpha_{j,t} + \beta^{1}{}_{i,t} Total\ exposure\ to\ shale\ boom\ counties_{i,t} + \\&\beta^{2} Acceptance\ Rate_{i,j,t-1} {*}\ Total\ exposure\ to\ shale\ boom\ counties_{i,t} \\&\beta^{3} Acceptance\ Rate_{i,j,t-1} + Borrower,\ Lender\ Controls + \varepsilon_{i,j,t}\ .\end{aligned} \tag{5b}$$

If banks export more liquidity to counties that have greater credit demand, then $\beta^2 < 0$.

Table 9 reports these results. We find strong evidence that the liquidity shock spurs lending most in areas that had low acceptance rates, which we interpret to act as a proxy for unsatisfied demand for mortgage credit. Columns (1) and (3) show that including the lagged acceptance rate is strongly correlated with mortgage growth – markets with high acceptance rates grow more slowly, validating the interpretation of this variable as a measure of unmet credit demand ($\beta^3 < 0$) – but that adding this variable does not change the overall effect of the liquidity windfall variables. Columns (2) and (4) report the regressions that include the new interaction effect, both of which enter with negative and significant coefficients, meaning that counties with low acceptance rates last year (i.e. high unsatisfied credit demand) respond more to the external liquidity shock this year.

We find large differences in movement of funds depending on our measure of unmet demand. For example, when demand is low (lagged acceptance rate = 90%), the coefficients in column 2 imply that exposed lenders (*Share of branches in boom counties* = 0.45) increase their mortgage loans by 7.5 percentage points more than unexposed lenders. In contrast, when unserved credit demand in high (lagged acceptance = 50%), the exposed banks increase mortgages 22 percentage points faster than unexposed ones.

In our last set of regressions, we test whether banks that were more constrained before the liquidity windfalls respond more to the windfall by increasing their mortgage portfolios more after the shock. Capital potentially will limit the extent to which a bank may deploy a given liquidity inflow from branches located in shale-boom counties, since banks must operate above regulatory required minimum capital ratios. Since capital is costly to increase in the short run, especially for small and medium sized banks without access to public markets, we would expect the impact of the liquidity shock to increase with the ratio of capital to assets.[7] Hence, we estimated models with the following structure:

$$\textit{Mortgage-growth}_{i,j,t} = \alpha_{j,t} + \beta^1 \textit{Share of branches in boom counties}_{i,t} + \beta^2 \textit{Capital/Assets}_{i,t-1} * \textit{Share of branches in boom counties}_{i,t} + \textit{Borrower, Lender Controls} + \varepsilon_{i,j,t}\,, \tag{5c}$$

and

$$\textit{Mortgage-growth}_{i,j,t} = \alpha_{j,t} + \beta^1{}_{i,t} \textit{Total exposure to shale boom counties}_{i,t} + \beta^2 \textit{Capital/Assets}_{i,t-1} * \textit{Total exposure to shale boom counties}_{i,t} + \textit{Borrower, Lender Controls} + \varepsilon_{i,j,t}\,. \tag{5d}$$

In estimating (5c) and (5d), we report models using the leverage ratio, equal to book value of equity divided to total assets. We have also estimated similar models using the ratio of Tier 1 capital to risk-weighted assets and found similar results. (Note that the direct effect of $\textit{Capital/Assets}_{i,t-1}$ has been included throughout as a borrower control variable.)

Table 10 reports these regressions, along with those that combine (5a) with (5c) and (5b) with (5d) by including both demand and financial constraint interaction terms together. Columns (1) and (3) report models with just the capital-assets interaction effect, and columns (2) and (4) report both interactions together. The results suggest that both aspects mediate the impact of the liquidity shock.

To understand magnitudes, consider first the difference in lending between exposed (*Share of branches in boom counties* = 0.45) and non-exposed banks with high acceptance rates (=0.9, implying little un-served credit demand) and low capital (=0.07, one sigma below the

[7] We have also tested other possible measures of a bank's financial constraints, such as asset size or holdings of liquid assets; these are not significantly related to the size of the liquidity shock's impact on mortgage growth.

mean). Our coefficients suggest that the exposed bank would grow its lending by just 2 percentage points faster than the non-exposed bank (using coefficients from column 2). Taking the other extreme, next consider the difference in lending between exposed and non-exposed banks with low acceptance rates (=0.5, implying substantial un-served credit demand) and high capital (=0.13, one sigma below the mean). In this case the coefficients suggest that the exposed bank would grow its lending 26 percentage points faster than the non-exposed bank. Thus, banks with high demand for credit that are able to deploy the deposit windfalls (due to high levels of ex ante capital) grow their mortgage portfolios very substantially in response to the liquidity windfalls.

IV. CONCLUSIONS

We have provided evidence of the importance of bank branch networks in fully integrating local credit markets. Wealth windfalls from shale-boom discoveries provide large and unexpected windfalls of deposits into branches located nearby. Mortgage lending increases in outlying (non-boom) areas for banks experiencing these deposits windfalls, but *only* when such banks have branches in *both* markets; lenders experiencing deposit inflows do not lend more in areas where they have no branch presence because, we argue, such loans embed little private information and thus can be funded in securitization markets.

To our knowledge, our results provide the first 'smoking gun' evidence that bank branching fosters financial integration by allowing savings collected in one locality to finance (shale-boom counties) investments in another (non-boom counties). The result is important because it demonstrates the limits to arm's length financing technologies like securitization in integrating financial markets. For credit markets that require lenders to locate near borrowers to adequately understand and monitor risk, securitization is not a viable financing mechanism. Thus, the increasing extension and density of bank branch networks in the US has been an important force working in parallel with the growth of securitization in fostering financial integration.

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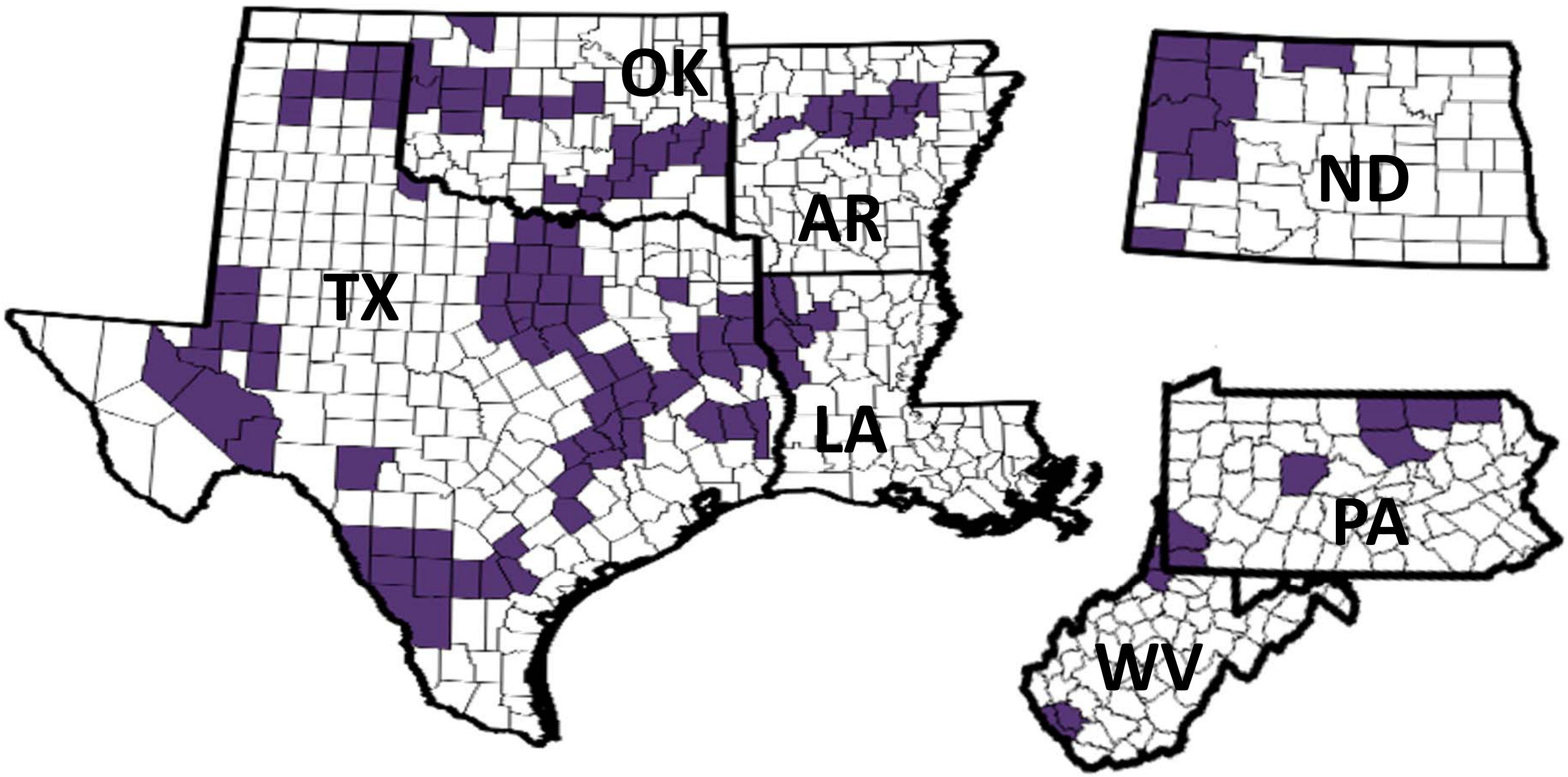

Figure 1: Location of Shale Activity
The figure maps the counties of the 7 shale boom states included in this study: AR, LA, ND, OK, PA, TX and WV. White counties are non-boom counties while shaded counties are shale boom counties as of 2010.

Table 1: Summary Statistics

This table reports summary statistics for banks operating in states with counties exposed to the shale boom. The sample is built from the 7 states that experienced fracking booms between 2000 and 2010. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. The distribution of bank branches comes from the FDIC *Summary of Deposits*, which we use to determine whether or not a branch (or the bank that owns it) is or is not exposed to the boom. Bank characteristics come from year-end *Call Reports*. Growth in mortgage originations comes from the annual *HMDA* data.

	Non-Exposed Banks		Exposed Banks	
	Mean	Std. Deviation	Mean	Std. Deviation
Panel A: Exposure to Liquidity				
Share of branches in boom counties	0	0	0.45	0.39
Total exposure to shale boom counties	0	0	0.25	0.51
Number of Banks	7,451		1,280	
Panel B: Bank Charactestics				
Deposit Growth	0.085	0.141	0.102	0.156
Log of Assets	12.451	1.390	13.428	2.090
Deposits / Assets	0.827	0.086	0.827	0.087
Cost of Deposits	0.022	0.010	0.017	0.008
Liquid assets / Assets	0.273	0.148	0.225	0.132
Capital / Assets	0.099	0.028	0.101	0.029
C&I loans / Asset	0.112	0.090	0.145	0.087
Mortgage loans / Assets	0.347	0.137	0.323	0.117
Net income / Assets	0.009	0.008	0.008	0.011
Loan Commitments / Assets	0.109	0.140	0.134	0.182
Letters of Credits / Assets	0.006	0.011	0.010	0.020
Panel C: Annual Mortgage Growth Rates				
Growth in Mortgage Originations	0.112	0.621	0.117	0.576
Growth in Retained Mortgages	0.077	0.672	0.091	0.618

Table 2: IV v. OLS Regressions of Mortgage Growth on Deposit Supply Shock:
Non-Boom Counties Only for All Lenders

This table compares OLS and IV regressions of the percentage change in mortgage originations by bank-county-year. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010. Bank-county-years are excluded if the county actually experienced a fracking investment. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Mortgage growth* equals the percentage change in originations from the prior year; *Retained growth* equals the percentage change in mortgages held on the lender's balance sheet; *Sold growth* equals the percentage change in mortgages sold by the originator. Regressions include both lender (reported) and borrower (not reported) control variables. Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county*year fixed effects.

Dependent Variable	First-Stage Deposit Growth	Mortgage Growth		Retained Growth		Sold Growth	
		OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Share of branches in boom county $_t$	0.156**	-	-	-	-	-	-
(First Stage Regression Coefficient)	(1.97)	-	-	-	-	-	-
Deposit Growth$_t$	-	0.637***	0.936*	0.575***	2.269***	0.434***	0.647
	-	(5.37)	(1.77)	(3.92)	(3.52)	(4.35)	(1.18)
Log of Assets$_{t-1}$	0.00294	-0.0139	-0.0148*	-0.0123	-0.0207*	-0.0238**	-0.0252***
	(0.71)	(1.63)	(1.76)	(1.38)	(1.87)	(2.53)	(2.94)
Deposits / Assets$_{t-1}$	-0.154	0.0245	0.0728	-0.261	-0.0931	0.114	0.16
	(1.64)	(0.15)	(0.37)	(1.24)	(0.33)	(0.60)	(0.79)
Cost of Deposits$_{t-1}$	-3.324	0.805	1.838	-0.287	1.372	-4.257	-2.618
	(1.56)	(0.35)	(0.67)	(0.09)	(0.41)	(1.01)	(0.64)
Liquid assets / Assets$_{t-1}$	0.0879	0.0963	0.0685	-0.0819	-0.183	0.392**	0.312
	(0.75)	(0.69)	(0.48)	(0.43)	(0.59)	(2.18)	(1.59)
Capital / Assets$_{t-1}$	0.0272	-1.471**	-1.467*	-0.3	-0.263	-2.118***	-2.158***
	(0.08)	(2.00)	(1.89)	(0.43)	(0.25)	(2.99)	(3.00)
C&I loans / Asset$_{t-1}$	0.273***	-0.0873	-0.175	-0.137	-0.483	0.118	0.0259
	(3.60)	(0.58)	(0.78)	(0.50)	(1.58)	(0.42)	(0.08)
Mortgage loans / Assets$_{t-1}$	0.167	-0.0567	-0.112	-0.0648	-0.279	0.192	0.0985
	(1.19)	(0.35)	(0.63)	(0.32)	(0.85)	(1.19)	(0.46)
Net income / Assets$_{t-1}$	1.027	3.822**	3.48	6.419*	8.175*	2.35	2.225
	(0.66)	(2.01)	(1.55)	(1.82)	(1.73)	(0.87)	(0.97)
Loan Commitments / Assets$_{t-1}$	0.0205	0.0171	0.0109	-0.0286	-0.0559	0.009	0.000886
	(1.46)	(0.71)	(0.38)	(0.74)	(1.09)	(0.27)	(0.03)
Letters of Credits / Assets$_{t-1}$	-0.289	0.942	1.058	0.488	1.2	2.608**	2.768***
	(0.83)	(1.14)	(1.29)	(0.62)	(1.47)	(2.43)	(2.66)
Borrower controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	92,144	92,144	92,069	71,034	70,910	49,427	49,221
R-squared	9.9%	2.8%		2.2%		2.4%	

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*

Table 3: Reduced Form Regressions of Mortgage Growth on Deposit Supply Shock: Non-Boom Counties Only for All Lenders

This table reports reduced form regressions of the percentage change in mortgage originations by bank-county-year on measures of the exposure to the shale-boom counties. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010. Bank-county-years are excluded if the county actually experienced a fracking investment. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. *Mortgage growth* equals the percentage change in originations from the prior year; *Retained growth* equals the percentage change in mortgages held on the lender's balance sheet; *Sold growth* equals the percentage change in mortgages sold by the originator. Regressions include both lender (reported) and borrower (not reported) control variables. Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county*year fixed effects.

Dependent Variable	Mortgage Growth		Retained Growth		Sold Growth	
	(1)	(2)	(3)	(4)	(5)	(6)
Share of branches in boom counties	0.146**	-	0.325**	-	0.202	-
	(2.17)	-	(2.26)	-	(1.26)	-
Total exposure to shale boom counties	-	0.0533**	-	0.223***	-	0.0674
	-	(1.97)	-	(2.69)	-	(1.37)
Log of Assets$_{t-1}$	-0.0121	-0.0124	-0.00956	-0.0107	-0.0217**	-0.0224**
	(1.45)	(1.49)	(1.11)	(1.27)	(2.10)	(2.15)
Deposits / Assets$_{t-1}$	(0.07)	(0.07)	(0.31)	(0.29)	0.06	0.07
	(0.41)	(0.39)	(1.40)	(1.32)	(0.31)	(0.33)
Cost of Deposits$_{t-1}$	(1.27)	(1.31)	(0.88)	(0.96)	(6.30)	(6.43)
	(0.43)	(0.44)	(0.24)	(0.27)	(1.37)	(1.39)
Liquid assets / Assets$_{t-1}$	0.151	0.144	-0.0596	-0.0864	0.497**	0.486**
	(1.08)	(1.03)	(0.31)	(0.45)	(2.58)	(2.53)
Capital / Assets$_{t-1}$	-1.442**	-1.439**	-0.243	-0.173	-1.987***	-1.990***
	(2.20)	(2.20)	(0.39)	(0.28)	(2.92)	(2.94)
C&I loans / Asset$_{t-1}$	0.081	0.0829	-0.0453	-0.0575	0.214	0.222
	(0.54)	(0.55)	(0.16)	(0.20)	(0.70)	(0.73)
Mortgage loans / Assets$_{t-1}$	0.0445	0.031	-0.0104	-0.0697	0.289*	0.269
	(0.29)	(0.20)	(0.05)	(0.33)	(1.73)	(1.54)
Net income / Assets$_{t-1}$	4.441**	4.517**	5.606*	5.764*	2.474	2.593
	(2.29)	(2.33)	(1.76)	(1.78)	(0.76)	(0.80)
Loan Commitments / Assets$_{t-1}$	0.0301	0.0292	-0.0191	-0.0222	0.0218	0.0194
	(1.32)	(1.28)	(0.51)	(0.59)	(0.57)	(0.51)
Letters of Credits / Assets$_{t-1}$	0.787	0.768	0.402	0.452	2.525**	2.497**
	(0.94)	(0.92)	(0.47)	(0.53)	(2.25)	(2.23)
Borrower controls	Yes	Yes	Yes	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes	Yes	Yes	Yes
Observations	92,144	92,144	71,034	71,034	49,427	49,427
R-squared	7.3%	7.3%	7.9%	8.0%	13.0%	13.0%

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*

Table 4: Reduced Form Regressions of Mortgage Growth on Deposit Supply Shock, Non-Boom Counties Only: Robustness Tests

This table estimates reduced form regressions of the percentage change in mortgage originations by bank-county-year. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010. Bank-county-years are excluded if the county actually experienced a fracking investment. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. *Mortgage growth* equals the percentage change in originations from the prior year. Regressions include both lender (reported) and borrower (not reported) control variables. Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county-year fixed effects.

Dependent Variable	Mortgage Growth			
	Drop Banks with <2.5% Exposure to the Boom		Bank-County observations with at Least 15 Mortgages	
	(1)	(2)	(3)	(4)
Share of branches in boom counties	0.172**	-	0.230***	-
	(2.50)	-	(3.22)	-
Total exposure to shale boom counties	-	0.0622**	-	0.0616**
	-	(1.98)	-	(2.32)
Log of $Assets_{t-1}$	-0.011	-0.011	-0.009	-0.009
	(1.21)	(1.25)	(1.47)	(1.47)
Deposits / $Assets_{t-1}$	-0.049	-0.045	-0.043	-0.042
	(0.27)	(0.24)	(0.33)	(0.31)
Cost of $Deposits_{t-1}$	-1.430	-1.488	-2.275	-2.253
	(0.51)	(0.53)	(0.78)	(0.78)
Liquid assets / $Assets_{t-1}$	0.163	0.156	0.016	0.013
	(1.06)	(1.01)	(0.14)	(0.11)
Capital / $Assets_{t-1}$	-1.183*	-1.179	-1.246*	-1.245*
	(1.65)	(1.65)	(1.93)	(1.91)
C&I loans / $Asset_{t-1}$	0.109	0.112	-0.097	-0.091
	(0.63)	(0.64)	(0.62)	(0.58)
Mortgage loans / $Assets_{t-1}$	0.085	0.070	-0.078	-0.086
	(0.52)	(0.42)	(0.68)	(0.71)
Net income / $Assets_{t-1}$	4.098**	4.193**	1.889	1.980
	(2.04)	(2.08)	(1.07)	(1.12)
Loan Commitments / $Assets_{t-1}$	0.026	0.026	0.0562**	0.0550**
	(1.09)	(1.05)	(2.11)	(2.06)
Letters of Credits / $Assets_{t-1}$	0.853	0.830	0.353	0.304
	(0.90)	(0.88)	(0.53)	(0.46)
Borrower controls	Yes	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes	Yes
Observations	81,788	81,788	30,365	30,365
R-squared	7.6%	7.6%	19.7%	19.7%

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*

Table 5: Reduced Form Regressions of Mortgage Growth on Shale-Boom Branch Exposure:The Effect of Local Lenders

This table reports reduced form regressions of the percentage change in mortgage originations by bank-county-year. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010. Bank-county-years are excluded if the county actually experienced a fracking investment. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. *Local lenders* are those with a branch in the county (distant lenders of those originating mortgages without a branch in the county). *Mortgage growth* equals the percentage change in originations from the prior year. Regressions include both lender (reported) and borrower (not reported) control variables. Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county*year fixed effects.

Dependent Variable	Mortgage Growth			
	All Lenders		Local Lenders Only	
	(1)	(2)	(3)	(4)
Local-lender indicator	0.008	0.008	-	-
	(0.48)	(0.54)	-	-
Share of branches in boom county	0.100	-	0.234**	
	(1.30)	-	(2.35)	
Total exposure to shale boom counties	-	0.035	-	0.103**
	-	(1.00)	-	(2.03)
Share of branches in boom county *	0.231**	-	-	-
Local-lender indicator	(2.17)	-	-	-
Total exposure to shale boom counties *	-	0.126**	-	-
Local-lender indicator	-	(1.99)	-	-
Log of $Assets_{t-1}$	-0.012	-0.012	0.009	0.009
	(1.52)	(1.54)	(1.03)	(1.05)
Deposits / $Assets_{t-1}$	-0.124	-0.121	0.404***	0.402***
	(0.69)	(0.66)	(3.91)	(3.90)
Cost of $Deposits_{t-1}$	-2.552	-2.555	-1.360	-1.360
	(0.85)	(0.85)	(0.25)	(0.25)
Liquid assets / $Assets_{t-1}$	0.116	0.112	0.260**	0.261**
	(0.80)	(0.78)	(2.19)	(2.19)
Capital / $Assets_{t-1}$	-1.432**	-1.431**	-0.320	-0.318
	(2.15)	(2.15)	(0.50)	(0.49)
C&I loans / $Asset_{t-1}$	0.019	0.022	0.185	0.190
	(0.12)	(0.14)	(1.16)	(1.19)
Mortgage loans / $Assets_{t-1}$	0.085	0.077	0.053	0.050
	(0.56)	(0.49)	(0.34)	(0.32)
Net income / $Assets_{t-1}$	3.872*	3.938*	2.103	2.155
	(1.85)	(1.87)	(0.82)	(0.84)
Loan Commitments / $Assets_{t-1}$	0.026	0.025	-0.101	-0.103
	(1.16)	(1.13)	(0.73)	(0.75)
Letters of Credits / $Assets_{t-1}$	0.654	0.628	-0.261	-0.304
	(0.75)	(0.72)	(0.38)	(0.44)
Borrower controls	Yes	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes	Yes
Observations	93,739	93,739	22,316	22,316
R-squared	7.3%	7.2%	20.2%	20.2%

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*

Table 6: Reduced Form Regressions of Mortgage Growth on Shale-Boom Branch Exposure: All Counties for Local Lenders Only

This table reports reduced form regressions of the percentage change in mortgage originations by bank-county-year. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010. In this table, we include bank-county-years that actually experienced a fracking investment in columns (1), (3) and (5). Columns (2), (4) and (6) include only non-boom counties; these repeat the results from Table 3 and are included to ease comparison across samples. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. *Mortgage growth* equals the percentage change in originations from the prior year; *Retained growth* equals the percentage change in mortgages held on the lender's balance sheet; *Sold growth* equals the percentage change in mortgages sold by the originator. Regressions include both lender (reported) and borrower (not reported) control variables. Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county*year fixed effects.

Dependent Variable	Mortgage Growth			
	All Counties		Non-boom Only	
	(1)	(2)	(3)	(4)
Boom-county indicator	Coefficient absorbed by the county-year fixed effects			
Share of branches in boom county	0.286***	-	0.234**	-
	(2.81)	-	(2.35)	-
Total exposure to shale boom counties	-	0.118**	-	0.103**
	-	(2.28)	-	(2.03)
Share of branches in boom county *	-0.272**	-	-	-
Boom-county indicator	(2.52)	-	-	-
Total exposure to shale boom counties *	-	-0.11**	-	-
Boom-county indicator	-	(1.98)	-	-
Log of Assets	0.00922	0.00939	0.009	0.009
	(1.20)	(1.21)	(1.03)	(1.05)
Deposits / $Assets_{t-1}$	0.390***	0.388***	0.404***	0.402***
	(3.92)	(3.90)	(3.91)	(3.90)
Cost of $Deposits_{t-1}$	-0.818	-0.827	-1.360	-1.360
	(0.16)	(0.16)	(0.25)	(0.25)
Liquid assets / $Assets_{t-1}$	0.343***	0.343***	0.260**	0.261**
	(2.95)	(2.94)	(2.19)	(2.19)
Capital / $Assets_{t-1}$	-0.21	-0.208	-0.320	-0.318
	(0.33)	(0.32)	(0.50)	(0.49)
C&I loans / $Asset_{t-1}$	0.248	0.255*	0.185	0.190
	(1.63)	(1.67)	(1.16)	(1.19)
Mortgage loans / $Assets_{t-1}$	0.114	0.111	0.053	0.050
	(0.77)	(0.74)	(0.34)	(0.32)
Net income / $Assets_{t-1}$	1.987	2.043	2.103	2.155
	(0.83)	(0.85)	(0.82)	(0.84)
Loan Commitments / $Assets_{t-1}$	-0.117	-0.119	-0.101	-0.103
	(1.11)	(1.13)	(0.73)	(0.75)
Letters of Credits / $Assets_{t-1}$	-0.0932	-0.141	-0.261	-0.304
	(0.14)	(0.22)	(0.38)	(0.44)
Borrower controls	Yes	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes	Yes
Observations	27,217	27,217	22,329	22,329
R-squared	0.196	0.196	0.202	0.201

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*

Table 7: Reduced Form Regressions of Mortgage Growth on Shale-Boom Branch Exposure by Mortgage Type, Non-Boom Counties and Local Lenders Only

This table reports reduced form regressions of the percentage change in mortgage originations by bank-county-year, broken out by mortgages for home purchase, home-equity lines, and refinancings. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010. Bank-county-years are excluded if the county actually experienced a fracking investment. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. Regressions include both lender and borrower control variables (not reported). Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county*year fixed effects.

Dependent Variable		Mortgage Growth	
	Home Purchase Mortgages	Home Equity Loans	Refinancings
	(1)	(2)	(3)
Panel A			
Share of branches in boom county	0.278***	0.320***	0.092
	(2.87)	(2.67)	(0.83)
Borrower & lender controls	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes
Observations	20,754	18,518	20,024
R^2	20%	25%	31%
t-value for: (1)==(2)		-0.042	
t-value for: (2)==(3)		0.228*	
t-value for: (1)==(3)		0.186	
Panel B			
Total exposure to shale boom counties	0.172***	0.171**	-0.00853
	(2.78)	(2.42)	(0.14)
Borrower & lender controls	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes
Observations	20,768	18,530	20,048
R^2	20%	25%	31%
t-value for: (1)==(2)		-0.001	
t-value for: (2)==(3)		0.180**	
t-value for: (1)==(3)		0.180***	

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*

Table 8: Reduced Form Regressions of Mortgage Growth on Shale-Boom Branch Exposure by Mortgage Type, Non-Boom Conties and Local Lenders Only

This table reports reduced form regressions of the percentage change in mortgage originations by bank-county-year, broken out by mortgages for home purchase, home-equity lines, and refinancings. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010. Bank-county-years are excluded if the county actually experienced a fracking investment. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. Regressions include both lender and borrower control variables (not reported). Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county*year fixed effects.

Dependent Variable		Mortgage Growth	
	Home Purchase Mortgages	Home Equity Loans	Refinancings
	(1)	(2)	(3)
Panel A			
Local-lender indicator	-0.0350**	-0.0372	-0.00673
	(-2.554)	(-1.206)	(-0.338)
Share of branches in boom county	0.0626	-0.172	0.188*
	(0.89)	(-0.978)	(1.91)
Share of branches in boom county *	***0.245*****	***0.592******	***0.0642***
Local-lender indicator	***(2.44)***	***(2.74)***	***(0.50)***
Borrower & lender controls	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes
Observations	64,860	34,839	66,237
R^2	9%	16%	15%
t-value for: (1)==(2)		-0.346	
t-value for: (2)==(3)		0.527**	
t-value for: (1)==(3)		0.181	
Panel B			
Local-lender indicator	-0.0348**	-0.0345	-0.00692
	(-2.564)	(-1.140)	(-0.355)
Total exposure to shale boom counties	0.034	-0.083	0.0483
	(1.07)	(-1.533)	(1.16)
Total exposure to shale boom counties	***0.154*****	***0.305******	***0.0328***
Local-lender indicator	***(2.33)***	***(2.87)***	***(0.45)***
Borrower & lender controls	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes
Observations	64,860	34,839	66,237
R^2	9%	16%	15%
t-value for: (1)==(2)		-0.152	
t-value for: (2)==(3)		0.273***	
t-value for: (1)==(3)		0.121*	

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*

Table 9: Reduced Form Regressions of Mortgage Growth on Shale-Boom Branch Exposure by Local Credit Demand, Non-Boom Counties for Local Lenders Only

This table reports reduced form regressions of the percentage change in mortgage originations by bank-county-year. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010, and includes only lenders with a branch in a given county. Bank-county-years are excluded if the county actually experienced a fracking investment. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. *Lagged mortgage acceptance rate* equals the bank's acceptance rate for mortgages made from the prior county-year. *Mortgage growth* equals the percentage change in originations from the prior year. Regressions include both lender (reported) and borrower (not reported) control variables. Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county*year fixed effects.

Dependent Variable	Mortgage Growth			
	Share of Branches		Total Exposure	
	(1)	(2)	(3)	(4)
Share of branches in boom county	0.239**	0.888	-	-
	(2.24)	(1.34)	-	-
Share of branches in boom county *	-	-0.799*	-	-
Lagged mortgage acceptance rate	-	(1.68)	-	-
Total exposure to shale boom counties	-	-	0.094*	0.423
	-	-	(1.91)	(1.17)
Total exposure to shale boom counties *	-	-	-	-0.409*
Lagged mortgage acceptance rate	-	-	-	(1.86)
Lagged mortgage acceptance rate	-0.702***	-0.662***	-0.701***	-0.669***
	(8.09)	(7.09)	(8.07)	(7.30)
Log of $Assets_{t-1}$	-0.0106	-0.00998	-0.0103	-0.00984
	(1.05)	(0.99)	(1.03)	(0.97)
Deposits / $Assets_{t-1}$	0.300***	0.310***	0.299***	0.306***
	(2.63)	(2.68)	(2.62)	(2.66)
Cost of $Deposits_{t-1}$	0.0319	0.0634	0.0249	0.0631
	(0.01)	(0.01)	(0.00)	(0.01)
Liquid assets / $Assets_{t-1}$	0.307**	0.305**	0.308**	0.306**
	(2.50)	(2.48)	(2.49)	(2.48)
Capital / $Assets_{t-1}$	-0.517	-0.526	-0.514	-0.519
	(0.73)	(0.74)	(0.72)	(0.73)
C&I loans / $Asset_{t-1}$	0.268*	0.270*	0.275*	0.277*
	(1.67)	(1.68)	(1.72)	(1.73)
Mortgage loans / $Assets_{t-1}$	0.223	0.219	0.219	0.217
	(1.44)	(1.41)	(1.42)	(1.40)
Net income / $Assets_{t-1}$	2.904	2.9	2.962	2.958
	(1.12)	(1.12)	(1.14)	(1.14)
Loan Commitments / $Assets_{t-1}$	-0.0948	-0.0923	-0.097	-0.095
	(0.63)	(0.62)	(0.64)	(0.63)
Letters of Credits / $Assets_{t-1}$	-0.0737	-0.0701	-0.125	-0.125
	(0.10)	(0.09)	(0.16)	(0.16)
Borrower controls	Yes	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes	Yes
Observations	22,316	22,316	22,316	22,316
R-squared	0.213	0.213	0.213	0.213

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*

Table 10: Reduced Form Regressions of Mortgage Growth on Shale-Boom Branch Exposure by Lender Financing Constraints and Local Demand, Non-Boom Counties for Local Lenders Only

This table reports reduced form regressions of the percentage change in mortgage originations by bank-county-year. Sample is built from bank-county-years in the 7 states that experienced fracking booms between 2000 and 2010, and includes only lenders with a branch in a given county. Bank-county-years are excluded if the county actually experienced a fracking investment. *Share of branches in boom county* equals the fraction of a bank's branches located in a shale-boom county during years after that county experienced investment in shale wells (variable set to 0 before the onset of the shale boom). *Total exposure to shale boom counties* equals the weighted exposure to the growth in the number of shale wells where the fraction of a bank's branches in boom counties serve as weights. *Lagged mortgage acceptance rate* equals the bank's acceptance rate for mortgages made from the prior county-year. *Mortgage growth* equals the percentage change in originations from the prior year; *Lagged bank capital ratio* equals the book value of capital / total assets for the lender from the prior year. Regressions include both lender and borrower (not reported) control variables. Lender controls are from the Call Reports from the prior year; borrower controls are the average borrower and area income, loan size-to-income ratio, percent women and percent minority and percent minority in the area for loans made during the current year (from HMDA). Standard errors are clustered by bank. All regressions also include county*year fixed effects.

Dependent Variable	Mortgage Growth			
	Share of Branches		Total Exposure	
	(1)	(2)	(3)	(4)
Share of branches in boom county	-0.176	0.417	-	-
	(0.45)	(0.58)	-	-
Share of branches in boom county *	3.582***	4.132*	-	-
Lagged Bank Capital Ratio	(2.92)	(1.85)	-	-
Share of branches in boom county *		-0.731**	-	-
Lagged mortgage acceptance rate		(2.01)	-	-
Total exposure to shale boom counties	-	-	-0.104	0.155
	-	-	(0.49)	(0.46)
Total exposure to shale boom counties *	-	-	2.131**	4.61**
Lagged Bank Capital Ratio	-	-	(1.97)	(2.13)
Total exposure to shale boom counties *	-	-	-	-0.389**
Lagged mortgage acceptance rate	-	-	-	(1.97)
Lender Controls	Yes	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes	Yes
County*Year FE	Yes	Yes	Yes	Yes
Bank clustered St Errors	Yes	Yes	Yes	Yes
Observations	22,316	22,316	22,316	22,316
R-squared	20.2%	21.3%	20.2%	21.4%

*T-stats reported in parentheses. ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.*