Informational Advantages of Lending Locally

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Abstract

Banks decrease loan originations and retention in potentially overheated housing markets when lending locally. This *within* bank finding holds even after addressing possible endogeneity concerns using historical branch networks and M&A activity as instrumental variables. For every 1 percent increase in home prices from 2002 to 2006, banks originated one less loan locally. Bank deposits may convey valuable market insights. Loans sold to Freddie Mac from banks with a local presence exhibit higher default rates, demonstrating superior bank knowledge and exploring a new channel for adverse selection. Banks exited precisely the markets that experienced price reversals.

Keywords: Mortgage Lending, House Price Growth, Loan Performance, Deposit Share, Branch Banking

JEL Classification: G21

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1 Introduction

In the modern mortgage market, banks lend locally and non-locally. Banks originate many of their mortgages in areas without branches. I show that this makes a substantial difference to outcomes. Banks make better long-run lending decisions with a local presence in the market in which they are lending.

From 2002 to 2006, there was an unprecedented increase in lending in the US residential real estate market, but there is scant discussion of smart money in the literature. I use 2002-2006 as a laboratory because home price deviations from fundamentals were extreme. I find evidence *within* bank, that banks behave differently when lending locally in response to high home price appreciation. This finding explores a new channel for adverse selection in loan securitization because the locally lent loans that were sold to Freddie Mac performed worse ex-post.

I define a lender to be *Lending Locally* if it has a branch in the county where the property is located for which the loan is being originated. I hypothesize that lenders lending locally react differently when prices are out of line with fundamentals. Lenders with a branch know their own deposit activity and are privy to soft information about the local economy. By this definition, any bank can lend locally if it has a branch. I show that a lender with a local presence behaves differently than — that same lender — does when it doesn't have a local presence. For example, in counties where Bank of America has branches, I consider them to lend locally and I show they exit overheated markets. However, in areas where Bank of America lends *but does not have a branch*, I get different results. Typically, when a bank is lending to an area without a branch, those applications are submitted online and serviced centrally.

Branches serve as proxies for loan officers. Although the exact location of loan officers is not known, they typically are dedicated to one or two bank branches in a specific region. In conversations with loan officers, they comment that while they work with their borrowers, they are aware of the local economic conditions as well. Regarding real estate, they know the agents and the housing stock and may have even

seen the same home recently appraised. While their incentives align with loan volume, they have reputational concerns for the long-term performance of their approvals and want to do a good job.

In my first set of results, I find that banks lent less *locally* in response to increasing home prices when controlling for a myriad of economic factors and mortgage demand. This result suggests that banks behaved differently when they had a local presence in the market in which they were lending. Importantly, this result is *within* bank, so the same bank is held fixed. The effect is driven by the bank having a branch in the county where the property is located. This result is new to the literature and begins to unpack the assertion that banks have information about their local markets. I use a cross sectional analysis because the mortgage default crisis provides a particularly dramatic setting to study the knowledge of lenders with a local presence. I argue that banks are intentionally exiting overvalued markets. I control for credit demand using the application for mortgages at each bank in 2002. On average, for every one percent increase in house prices, banks originated two fewer loans locally.

A potential channel for the transmission of information in the local economy is captured by bank deposits. Recent papers (Drechsler et al. (2017),Yang (2022), Iyer et al. (2023)) document the importance of deposits and how deposits can convey information about local market conditions. I use the deposit share of a lender to capture the intensity of information banks with branches could have about a region. On the extensive margin, the deposit share results replicate that of having a branch. On the intensive margin, having a greater deposit share impacts loan originations only as house prices appreciate. This suggests that banks are responding to greater knowledge about the area's true reflection of house prices supported by fundamentals. The premise is that by having a greater exposure to the region via bank deposits, banks are able to understand the local economic conditions.

Admittedly, the branch network in 2002 could be endogenous to the lending decision during the run-up to the crisis and potential home price behavior since banks may select more enticing areas to locate their branches. So, I use two instruments for

the branch network in 2002, the first is the historical branch network defined by the branch network in 1994, and the second is a branch network captured by bank mergers and acquisitions (M&A). The results continue to support the findings that banks slowed their lending in overheated areas where they had a branch, and in fact, the magnitude is the same on average for every one percent increase in house prices, banks originated two fewer loans locally.

I then separate the local loans into loans sold by the lenders and loans the lender retains on its balance sheet to determine if locally lent loans are sold more. Purnanandam (2011) and Mian & Sufi (2009) describe how securitization during this period played a large part in the role of credit supply and the increase in housing prices. If lenders lending locally understand that the housing market is overheating, then fewer locally made loans should be held after origination since the lender would incur losses if the borrower were to default.

I capture this by looking directly at the *change* in the *proportion* of loans retained. The measure is the retention rate of the newly originated loans, and the *change* reflects bank behavior only since they decide the proportion of retained loans. Unlike the origination decision that aptly needs to control credit demand, banks' decision to change their securitization pattern speaks to their desire to reduce exposure to the market. It is, in fact, the case that banks retain fewer loans from high home price appreciation areas when they had a branch in the region.

I find local lending was securitized more in home high-price appreciation areas. This evidence suggests that lenders lending locally understand when prices exceed the home's value and exit the market to safeguard their portfolios against future mortgage defaults. A one percent increase in home prices decreases local retention by 33 thousand dollars.[1]

So, when banks did lend locally, they decreased the proportion of loans they re-

[1]I look at securitization rates within the sub-market of local loans. I do not differentiate between prime and subprime loans. Though I recognize the potential for different behavior across loan pools, previous studies have shown that concentrated lenders tend to lend to riskier borrowers. Agarwal et al. (2012) has an excellent discussion of adverse selection in mortgage securitization regarding pre-payment versus default risk for further information on subprime lending.

tained on their balance sheets. Naturally, it is interesting to know what became of those loans. The loan performance data provided by Freddie Mac Single Family Home Loans shows a life of the loan after origination. With these data, I can track the performance of locally lent loans.

The results show that loans sold to Freddie Mac from lenders with a branch in the county where the loan originated spent more time "delinquent." Not only do they default more, but they default more quickly than non-locally made loans. This suggests that while banks are better informed about their market, the information advantages can result in moral hazard since they may not be willing to retain the risk.

Home prices did not behave the same across all regions of the U.S. during this period. As is widely understood, certain areas experience large swings in prices, whereas others only increased, and others barely moved at all. I explore these regional differences by measuring how much home prices rose from 2002-2006 and then subsequently fell from 2006-2009.

I create a *peak to trough* measure that captures if an area saw large price movements during both the boom and the bust periods. I then group these areas into terciles and explore the local lending behavior across the different regions.

The results show that the decrease in local lending was concentrated in areas that experienced a significant price increase and subsequent fall, such as Las Vegas. In some zip codes, which saw an increase in home prices but no noticeable crash, or in areas, where home price growth remained relatively flat, local lending did not decrease. This evidence suggests that lenders with a local presence exited precisely the right markets.

The loan officers who make these lending decisions work and live in the area and want to see it flourish. Imprudent lending that could result in loan defaults or foreclosures would negatively impact the area. For example, Campbell et al. (2011) finds that foreclosure at a distance of 0.05 miles lowers the price of a house by about 1%.

My results suggest that lenders with branches in the counties where they made their loans take the time to understand more completely the true value of the housing market via local economic information. Understanding the information conveyed by

their bank deposits and by operating in an area enables them to secure returns on their investments. It also highlights the need for bank counterparties to consider *how* a loan is originated.

These relationship between originations, securitization, house prices, and loan performance suggests that lenders lending locally demonstrate smart banking.

2 Literature Review

The literature has largely emphasized how banks "follow the market" without taking caution, and that housing price appreciation makes them more tolerant of risk. Yet, the importance of information in financial contracting cannot be overstated. For lenders to make loans, they must first decide if the conditions of the loans are favorable. Studying lending behavior across institutions is useful because the supply of credit and financial intermediation is heavily attributed to helping an economy grow.[2]

I use the branch network of a lender to proxy for the lender's ability to gather information about the local economy. Adelino et al. (2019) show informed sellers in the mortgage market can signal loan quality and my paper explains how sellers become better informed, i.e., by having a physical presence in the market.

Bank deposits can convey information to a bank about their local area by reflecting the economic activity and financial health of the community. Higher deposit levels may indicate a prosperous local economy, while declining deposits could signal economic challenges. Drechsler et al. (2017) demonstrate the importance of bank deposits for lenders and how monetary policy changes can affect this funding channel. Yang (2022) argues that deposits from local consumers convey private information about the local credit market, which helps banks in information-sensitive lending. Iyer et al. (2023) build on this premise and show that banks can detect regional economic downturns, so, a useful measure to appreciate the local economic condition is to closely follow bank deposit rates.

[2]See: Demirgüç-Kunt & Maksimovic (1998); Jayaratne & Strahan (1996); King & Levine (1993); Levine et al. (2000); Paravisini (2008); R. G. Rajan & Zingales (1998); Rice & Strahan (2010) among others.

My paper contributes to the literature by showing that banks have the ability to learn *information about the market beyond borrower behavior*, and this knowledge increases the asymmetric information for their potential trade partners, such as Freddie Mac.

Recent literature documents the advantages of having a physical presence. Bai & Massa (2021) show how important information is not easily replaced by other information sources and how certain information originates mainly from physical interaction. Along these lines, both the size of the institution and the distance from borrowers have been suggested in prior literature as important factors in the institutions' willingness to make loans because of their ability to stay informed.[3]

Loan officers work at a specific branch, or a few branches, within a very concentrated area, so they know when home prices are supported by fundamentals, such as increased economic opportunities in the area or new school districts. Gao et al. (2023) find that managers' past experiences with mortgage approval and pricing significantly influence their subsequent lending standards.

Loan officers can also see when home prices rise for other reasons, such as the appraisal process. Fout et al. (2022) show how appraisal values affect financing costs is directly determined by the loan officer approval decision. Carvalho et al. (2022) show how loan officers' personal experiences influence their lending decisions, and Bushman et al. (2021) show how that influence can affect loan contract design and performance.

Puri & Iyer (2012) find that stronger relationships between banks and depositors can help mitigate bank runs. These results make sense because soft information produced over time is non-transferable. My measure allows small and large banks to be classified as "lending locally" as long as they have a branch in the county where they are making loans. It is an important distinction because I am quantifying *lending locally*, not just "local lenders". Borrowers can form bonds with branch employees regardless of the size of the bank.

[3] Agarwal & Hauswald (2010); Coval & Moskowitz (2001); DeYoung et al. (1999); Ergungor (2010); Kroszner & Rajan (1994); Morse (2011); Lerner (1995).

Some studies suggest the supply of credit played a part in the housing crisis.[4] While my paper is not about the housing crisis, that time provides a nice laboratory to study because the swings in home prices and bank behaviors were extreme. Over time, mortgage lending practices loosen, and the average borrower's leverage increases, which subsequently leads to more borrowers defaulting on their loans.[5] Some regions experience an increase in mortgage originations, even while relative income growth decreases. Lenders differ in their abilities and willingness to invest in information gathering about the default risk of their borrowers.[6] Gurun et al. (2016) show that subprime lenders marketed mortgages differently across borrowers. Adelino et al. (2016) show not all lending was driven by subprime borrowers. Those differences in lending strategies lead to divergence among lenders in how informed they are about their loan portfolios.

R. Rajan & Ramcharan (2015) show that, in fact, credit expansions across lending types can lead to economic growth. If the supply of credit contributed to the housing crisis, it is important to determine how lenders behaved differently when they could readily access information about the market compared to when they could not. My findings suggest that lenders with information about the local economy exited areas with the worst housing price declines.

3 Data Description

In this paper, I merge together three main datasets to identify local lending. Residential mortgage applications are merged with both the location of the lender's branch network and the respective home prices in the local area. The ability to match the lender is what allows for a clean definition of local lending. Further data is used to capture bank mergers, loan performance and hard information observables. Summary statistics of measures used are reported in Table (1).

[4] LaCour-Little et al. (2011); Favara & Giannetti (2014); Gerardi et al. (2007); Keys et al. (2010); Loutskina & Strahan (2009); Mayer & Pence (2008); Mian & Sufi (2009).

[5] Agarwal & Wang (2009); Loutskina (2011); Loutskina & Strahan (2011); Mian et al. (2015); U. Rajan et al. (2010).

[6] Stiglitz & Weiss (1981).

3.1 Residential Mortgages

The mortgage loans' data are from the Home Mortgage Disclosure Act (HMDA) database. HMDA reports information on mortgages originated by both depository institutions and independent mortgage companies. This study focuses on depository institutions, which, conditional on the annually adjusted threshold of assets, must report information about all loan applications. HMDA provides information on loan application characteristics, such as application status and the loan amount for any reporting institution. The HMDA lender identifiers are from the Avery File constructed by Robert Avery at the Federal Reserve Board.[7] The HMDA sample corresponds to the years 2002 and 2006. I construct a cross-section from this time period to highlight the behavior of banks during a setting in which home prices arguably diverged highly from fundamentals.

I keep observations where the field '*action taken*' is either *approved*, *approved not accepted*, or *denied*. The final sample corresponds to observations in which an applicant is applying for a conventional loan for purchasing a single-family owner-occupied home, and the mortgage loan is secured by *first lien*.[8]

In the next step, I aggregate HMDA data to the county-bank-year level to estimate variables of interest. Specifically, I estimate the total number of applications *received*, *originated*, and *held* by a bank in a county-year. I also calculate the aggregate loan amounts corresponding to applications *received*, *originated*, and *held* by a bank in a county-year. Lastly, I estimate income and loan-to-income ratio of a bank's representative (average) borrower in a county-year.[9]

An important note is that this paper focuses on loan originations and not loan refinance applications because the bank itself partakes in the valuation process for a mortgage refinance. Whereas the mortgage application for loan origination is dictated by

[7] I access the Avery File from Neil Bhutta's website. The Avery File matches a subsidiary of a bank to the parent institution. A reporting entity part of a bank holding company is matched to the holding company's largest bank.

[8] The *property type*, and *lien status* information is available in HMDA from 2004 onwards.

[9] Self-reported variables, such as an applicant's income, in HMDA are problematic to use (Favara & Imbs, 2015); therefore, I work with the average income and average loan-to-income ratio.

the purchase price, which is set by the buyer and seller specifically, and the market as a whole.

3.2 Bank Branch Locations

To identify a bank's branch presence in a county, I use *Summary of Deposits (SoD)* data from the Federal Depository Insurance Corporation (FDIC). The SoD is an annual survey of branch office deposits for all FDIC-insured institutions. The dataset provides complete information about the geographic location of a branch. The data correspond to June end of each year. I use SoD data for the years 1994 and 2002 to determine the local presence of a lender.

3.3 Home Prices

The zip code-year level median home price data are from the Zillow Home Value Index. These data are available from 1996 onwards. Zillow provides monthly seasonally adjusted pricing data for a typical home at the zip code level.[10] To match a zip code with county FIPs, I source a zip code-county matched file from the Missouri Census Data Center (MCDC). There are instances in which multiple counties share a zip code. In those cases, I allocate a multi-county zip code to all counties sharing that zip code. This study uses Zillow data for the years 2002, 2006, and 2009.

3.4 Bank Mergers

As previously mentioned, banks chose their branch network. This decision makes their branch locations endogenous to other bank decisions, such as lending. To address this endogeneity and make causal claims, I use instrumental variables. One of the instruments is based on the merger and acquisition activity (M&A) of the bank.

The M&A data are from the Federal Reserve Bank of Chicago. These data provide information on banks involved in M&A activities since 1976. This study uses

[10] Mian & Sufi (2009) find that Zillow Home Price Index correlates positively with the Fiserv's Case Shiller Weiss index.

data corresponding to non-failing banks involved in M&A activity in which the non-survivor transfers its assets to the survivor, and non-survivors charter is discontinued. All mergers (or acquisitions) that take place between July of year *t-1* and June of year *t* are allocated to year *t*. This step ensures consistency of M&A data with the reporting frequency (June end each year) of Summary of Deposits data. The sample consists of 5,266 mergers between 1994 and 2002.

Figure A.1 presents the intuition behind the mergers and acquisitions instrument. It shows how the newly acquired branch network instruments for the original branch network, and in the case of multiple acquisitions, how the final branch network is defined.

3.5 Loan Default Data

After identifying that local lending behavior differs in response to high home price growth, a natural variable of interest is the outcome of the loans that, in fact, are originated. To capture loan performance, I use a recently made available data set from Freddie Mac, a prominent Government Sponsored Entity (GSE). For all loans that originate in 2006 and eventually are sold to Freddie Mac, I source their origination and monthly performance data from the *Single Family Loan-Level Data set*.[11]

This dataset results from Freddie Mac's efforts to increase transparency and help investors build more accurate credit performance models. In addition to providing information characteristics of a loan contract at its origination and over its tenure, Freddie Mac's single-family loan-level data set includes information on a contract's geography. Specifically, the dataset provides information on a property's state and the first three digits of a property's 5-digit zip code.

[11]Fannie Mae reports a similar data set however, while the Emergency Home Finance Act 1970: FHLMC or "Freddie Mac" allowed Fannie Mae to purchase conventional mortgages and allowed Freddie Mac to purchase FHA and VA mortgages, they do tend to still focus on their original lines of business and my study focuses on traditional loans without additional government regulations.

4 Research Design and Results

4.1 Econometric Specification

The main research design uses a cross-sectional analysis of the data and is done *within* bank. There are two reasons to use this design. The first is that the research question is about local lending. All banks can have a local presence via their branch location, regardless of other institutional details such as size. The second is the period from 2002 to 2006, which marks a time with home price appreciation where realized home prices, arguably, deviated from home price fundamentals.

I run a linear regression model that tests for the effect of a local presence on important lending decisions such as loan origination and retention.

$$\begin{aligned}\text{Outcome}_{cb2006} =& \beta_1(\text{Lending Locally}_{cb2002} \times \text{Home Value Growth}_{c2006}) \\ &+ \beta_2 \text{Lending Locally}_{cb2002} + \Gamma' \text{X}_{cb2006} + \text{Bank}_b + \text{County}_c + u_{cbt}.\end{aligned} \tag{1}$$

The subscripts *b* and *c* represent a bank, and county, respectively. *Lending Locally* is a dichotomous variable that equals 1 if a bank has a branch in a county in 2002. *Home Value Growth* is the average growth in the zip code level median home value index between 2002 and 2006 in a county. Control variables that include important factors such as borrower characteristics are included as well. Bank fixed effects are used across all models to identify exactly the difference between banks' behavior with and without a bank branch. County fixed effects are used to capture specifics of the local market at the time of lending. The key coefficient β_1 is identified because banks lend to borrowers in multiple counties, and borrowers in a county borrow from multiple banks

4.2 Results

4.2.1 Lending Locally and Loan Origination

The starting point of this analysis is the negative relationship between lending locally and home price growth. Figure (1) plots the difference in home value growth and the average logarithm of the number of mortgage originations between lending type, local and non-local (*within bank*) in 2006. Figure (1) presents a plot of average mortgage applications originated growth, and average home value growth, within bank by the lending type (local or non-local) in 2006. Both figures show from the raw data the tendency for local lending to decrease in high home prices appreciation areas.

Column 1 in Panel A, Table (2) summarizes the main result of the within-lender analysis for loan origination in which the "Outcome" from Equation 1 is the growth rate of the number of applications originated from 2002 to 2006. Column 2 adds *Application Market Share* to capture the demand for credit at the lenders with bank branches in the local area. Column 3 adds borrower characteristics to account for borrower income and borrower loan-to-income ratios. The results remain consistent across the models that local lending decreased in response to home price appreciation during the run-up to the crisis.

The coefficient from the interaction of *Lending Locally* and median home value in Column 3 of Panel A in Table (2) is -1.25. The summary statistics in Table (1) report that, on average, a bank originated 53 loans per year in a given county between 2002 and 2006. So, a one percent change in home price led to one fewer (-0.625=-1.25/100*53) loan originations when a bank has a branch in the county where the property is located.

On average, home prices rose roughly 9 percent annually, suggesting that roughly 36 fewer home loans were originated locally in each county from 2002 to 2006.

Panel B of Table (2) changes the dependent variable to the growth rate of the volume of loans originated from 2002 to 2006. Column 3 shows the results for the full model, and a one percent change in home price led to, on average, 250 thousand dollars less in local lending.

The results show that lenders behave differently when they have a local presence. *Lending Locally* is one if the bank has a branch in the county where the property is located, and Equation 1 includes lender fixed effects, so *within* the same lender, mortgage origination behavior differed in response to home price appreciation.

This evidence further supports the view that physical presence matters to access local information. The mechanism by which soft information is transferred into the lending decisions is, by definition, difficult to measure; however, the evidence consistently demonstrates that a bank branch is important to lending decisions.

4.2.2 Potential Channels

I argue that banks with a physical presence in the market where they originate loans possess superior market knowledge. Lenders with a physical presence can glean information for their own interaction with the economy but another way lenders can be better informed is by paying attention to their deposit activity. The idea is that banks would see movements in their deposits and could appreciate the economic wellbeing in an area with this indicator. Bank deposits serve as a valuable source of insight for banks regarding their local region, offering a glimpse into the economic vibrancy and fiscal well-being of the community. Elevated deposit volumes often signal a thriving local economy, potentially indicating robust economic activity.

Because both *Deposit Share* and *Home Value Growth* are continuous variables, it is useful to present their interaction in a picture. Figures (3a) and (3b) show a declining relationship between bank lending defined by either number of applications or application volume. The point with the lowest loan growth, shown in the bottom right-hand corner, is when house price appreciation is high and *Deposit Share* is also high. Holding home price growth constant, there is a downward slope in lending as *Deposit Share* increases.

Table (3) captures the relationship between a lender's *Deposit Share*, house prices and lending. Panels A and B, Columns 1-3 replicate the findings in the baseline regression and show that having a greater share of deposits (potentially greater access

to information) in an area is negatively associated with loan origination in areas with high home price appreciation.

Table (3) Column 4 studies the effect, however, when an area experiences below median house price growth. The results from Column 4 show that there is no effect from the interaction term. Contrast this with Column 5, which reports areas with above median house price growth, where the effect is strongly pronounced.

Comparative statics helps unpack the results since both variables of interest are continuous. The interpretation is that, holding the home price growth level constant, a bank with *Deposit Share* level of 20% originates approximately 11 less loans but that same bank with *Deposit Share* of 80% originates 45 less applications. The effect primarily comes from how easily a bank can extract information about their local market. Which is what is defined by having a higher *Deposit Share*. Similar logic applies to the loan volume numbers. For the same bank, as they move from 20% to 80% *Deposit Share*, they originate roughly $50,000 less.

If there is no noticeable changes in deposit growth in areas with high home price appreciation, this may signal to banks that the house prices are not substantiated with real economic growth. Banks would also see real time fluctuations that could be missed with aggregate measures that are less granular and only available with a time lag. [12]

4.2.3 Endogeneity Concerns

4.2.3.1 Instrumental Variables Based on 1994 Branch Network

I use two instrumental variables to address the endogeneity concerns of a bank's branch network in 2002. The first instrument is the bank's branch network in 1994. Branches networks are notoriously sticky. The correlation of the branch network in 1994 and 2002 is 0.56. Table (4) shows a strong first stage supporting instrumental design. The methodology is similar to that of (Mian & Sufi, 2009), who exploit the share of subprime borrowers as of 1996 for analysis during the housing boom and (Gilje et al., 2016), who use pre-shale-boom branch locations. While it is true that banks chose their histori-

[12] Publicly available data on deposits from the FDIC SoD is annual, so banks would have a better understanding than what annual aggregates would represent.

cal network as well, the historical network meets the exclusion restriction because the likelihood that lenders chose those locations based on potential lending decisions in the future — conditional on home price growth — is unlikely.

Table (5) replicates Table (2) by instrumenting *Lending Locally* by the *Lending Locally using the 1994 Branch Network*. The results consistently show that local lending declines with home price appreciation. Panel A details the results for loan applications, and the IV approach matches the OLS model that increasing home prices results in two fewer loans being originated.

Panel B details the results for loan volume, and the results are even stronger, showing a million to a million-and-a-half dollar decrease in local lending.

4.2.3.2 Instrumental Variable Based on M&A Activity

The second instrument is the bank branch network resulting from a recent merger and acquisition. In this method, the acquiring bank's branch network from 2002 is instead instrumented by the non-surviving bank's branch networks from mergers between 1994-2001 (inclusive). Table (A.1) shows a strong first stage too. This method is potentially prone to endogeneity concerns since the purchasing bank bought the non-surviving bank for a reason, and the depositor footprint would be attractive, so I also use the branches that are "incidental" to the purchase as these branches do not make up the main portfolio of the non-surviving bank. This approach is similar to that of Buchak & Jørring (2022).

Table (A.2) replicates Table (2) but this time instrumenting *Lending Locally* by the *Lending Locally using the M&A Branch Network*.

Similar to the IV approach using the historical branch network, when instrumenting the branch network in 2002 with a branch network based on M&A Activity, the results match the OLS results. The main findings remain, local lending decreases, and the economic magnitudes are similar.

Taken together, the two IV approaches suggest that while bank branches are endogenous, they are a reliable proxy for more informed decision-making.

4.2.4 Lending Locally and Securitization

Prior literature shows the increased reliance on securitization during the housing boom. The decision to hold loans on a bank's balance sheets, rather than originate and distribute, is arguably even more pertinent to the bank than the decision to originate the loan.

I measure the securitization practice at a lender by taking the first difference of the proportion of loans originated and *retained* in 2002 and 2006. For example, if Bank A retains 40 percent of its loans in 2002, and 20 percent in 2006, then the change would be -20.

Table (6) summarizes the results of loan securitization. In Panel A the "Outcome" in Equation 1 is the *Change in the Proportion of Loans Held* and measured by the number of applications. Panel B shows the results by loan volume. Banks reduce both the number and volume of loans held.

The decision to reduce the amount retained is wholly made by the bank itself without compounding effects of market competition or borrower demand. The securitization process is often considered in aggregate, as the sum of the loans is sold off rather than individual mortgages. A one percent increase in home prices results in local retention decreasing by 33 thousand dollars.

4.2.5 Loan Performance

When banks did lend locally in high home price appreciation areas, they also securitized more. Table (7) reports the results of the linear regression model that tests for the effect of a local presence on loan performance of loans that were originated in 2006 and *sold* to Freddie Mac. As with previous models, bank fixed effects are included so the results come from the presence of a bank branch and are *within* lender.

$$\text{Loan Performance Metric}_{izcb} = \beta_1 \text{Lending Locally}_{cb2002} + \text{Bank}_b + \text{zip code}_z + \text{u}_{izcb}. \tag{2}$$

Loan performance metrics measure loan level (subscript *i*) outcomes capturing default behavior. Table (7) Panel A reports the results of a loan performance first by capturing if the loan has spent time "delinquent," as measured by being more than 28 days past due. Column 1 focuses on the time period from 2006-2013, capturing the worst years of the housing and financial crisis. When a loan was made by a bank that had a branch in the county where the property was located, it was more likely to spend time "delinquent." Loan defaults rose during this period however, on average, loan default is uncommon. The results are both statistically and economically significant. The default rate from 2006-2013 in the Single Home Freddie Mac data is 1.6%. Column 1 reports the coefficient is 0.2% which explains roughly 10% of loan defaults. Column 2 extends this analysis to cover 2006-2018. The statistical significance increases, and the magnitude of the coefficient remains approximately the same.

Panel B reports the "Time to Delinquent." Both Columns 1 and 2 show that loans default *faster* when made locally. Both models include borrower credit score as a control.

The evidence suggests that banks are informed about their lending portfolio and securitize loans with a higher incidence of default, demonstrating moral hazard. This result is new to the literature and shows that bank trading partners need to consider *how* a loan is originated. When banks have a local presence in the markets in which they are lending, they are privy to better information, which puts the counterparty, in this case Freddie Mac, at an informational disadvantage.

4.2.6 Lending Locally in markets with large peak and trough movements

The literature is rife with work studying the Great Recession. However, there is no evidence of "smart money." Real estate markets are particularly reliant on location. While Equation 1 includes zip code fixed effects, Tables (2) through (7) treat the US similarly. During the run-up to the housing crisis, certain regions of the US experienced large increases in house prices and then experienced a subsequent crash (Las Vegas),

however certain zip codes in other markets saw home prices rise but not fall, and yet others, saw hardly any home price appreciation. Important to note is that lenders have very localized knowledge as not all zip codes in a given geographical area behaved the same.

To account for this, I create a measure named *Peak-Trough Ratio*. The ratio is the growth in median home prices from 2006 to 2009, divided by the growth in median home prices from 2002 to 2006. For example, in zip code 89031, located in Las Vegas, home prices rose from roughly $175 thousand in 2002 to $310 thousand in 2006, only then to fall to $148 thousand in 2009. The ratio is -0.68. Contrast this with zip code 2118, in Boston, where home prices rose from $370 thousand in 2002 to $470 thousand in 2006, and continued to rise to $527 thousand in 2009. There the ratio is 0.43.

After calculating the ratios at the zip code level, I group the measure into terciles so that similar price patterns are identified regardless of their geographical region. Admittedly this is a forward-looking measure I could construct with perfect hindsight.

I update the main regression model and use the *Peak-Trough Ratio* to replace the *Median Home Value Growth*.

$$\begin{aligned}\text{Outcome}_{cb2006} =& \beta_1(\text{Lending Locally}_{cb2002} \times \text{Peak-Trough Ratio}_c) \\ &+ \beta_2 \text{Lending Locally}_{cb2002} + \Gamma' \text{X}_{cb2006} + \text{Bank}_b + \text{County}_c + u_{cbt}.\end{aligned} \tag{3}$$

Column 1 of Table (8) shows the results for local lending are completely driven by the areas that experience a large increase followed by a large decrease in prices. Home prices fell more in areas that experienced less local lending from 2002 to 2006. Confirming the information based explanation, these results suggest that local lending decreased with the expectation that home prices deviated from fundamentals and would eventually experience a market correction.

Panel B shows the results for loan volume. Column 1 shows the results are concentrated again in the Bottom Tercile. The coefficient of -0.55 means that if in Las Vegas, for

example, home prices had instead fallen ten percent *less* in 2009, banks would have lent locally roughly $2 thousand dollars *more* for each percentage increase in home prices from 2002-2006.

Since the economic effect is in thousands of dollars for panel B, a 10 percent increase in 2006 median home price in Las Vegas suggests that local banks lend 1.2 million dollars less. In contrast, a 10 percent increase in 2006 median home price in Boston suggests that local banks lent 1.7 million dollars more.

Both results show banks behave differently when lending with a physical presence based on the local knowledge of the market.

5 Conclusion

Banks trade on information, and the findings in this paper show that banks lending locally behave differently in response to potential market mispricing. Previous literature shows that bank branch networks serve multiple purposes, mainly with better client access. Importantly, this paper shows that banks have information about their *markets*, not just their borrowers.

The ramifications for bank lending speak directly to the collateral underlying bank lending decisions and their ability to price their lending products properly. In the case of real estate, better information allows for more prudent lending overall but also shows how banks are willing to trade potential short-term gains for longer-term stability and profits. Additionally, when banks are in better lending positions, their counterparts can pay the price, as is shown by the default behavior of securitized loans. As more lending decisions are impacted by the introduction of technology etc. it will be an important facet of the loan to know how a loan was originated, and to what degree the process was automated.

Future research on the long-lasting effects of introducing financial technology, regulation on competition and bank diversification, and bank branch closures will be paramount to maintaining the informational advantage of lending locally.

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Definitions of Key Variables

This table presents the definitions of key variables used in various analyses in this study. The subscripts b, c, z represent *bank*, *county*, and *zip code*, respectively.

Variable Name	Definition
Applications Originated Growth$_{cb2006}$	$\frac{\text{Number of Applications}_{cb2006} - \text{Number of Applications}_{cb2002}}{\text{Number of Applications}_{cb2002}} \mid$ Application Status = Approved and Originated
Loan Volume Growth$_{cb2006}$	$\frac{\text{Loan Volume}_{cb2006} - \text{Loan Volume}_{cb2002}}{\text{Loan Volume}_{cb2002}} \mid$ Application Status = Approved and Originated
Change in Proportion of Applications Held$_{cb2006}$	$\frac{\text{Number of Applications}_{cb2006} \mid \text{Application Status = Approved, Originated, and Held}}{\text{Number of Applications}_{cb2006} \mid \text{Application Status = Approved and Originated}} - \frac{\text{Number of Applications}_{cb2002} \mid \text{Application Status = Approved, Originated, and Held}}{\text{Number of Applications}_{cb2002} \mid \text{Application Status = Approved and Originated}}$
Change in Proportion of Loan Volume Held$_{cb2006}$	$\frac{\text{Loan Volume}_{cb2006} \mid \text{Application Status = Approved, Originated, and Held}}{\text{Loan Volume}_{cb2006} \mid \text{Application Status = Approved and Originated}} - \frac{\text{Loan Volume}_{cb2002} \mid \text{Application Status = Approved, Originated, and Held}}{\text{Loan Volume}_{cb2002} \mid \text{Application Status = Approved and Originated}}$
Delinquent	A dichotomous variable that equals 1 (0 otherwise) if a loan is at least 28 days past due the date of installment reported by the servicers to Freddie Mac.
Time To Delinquency	Loan age at the time *Delinquent* flag takes on the value of 1 for the first time.
Home Value Growth$_{c2006}$	$\frac{1}{\mathbb{N}_c} \sum_{z \in c} \frac{\text{Median Home Value}_{z2006} - \text{Median Home Value}_{z2002}}{\text{Median Home Value}_{z2002}}$ where $\mathbb{N}_c$ represents number of zipcodes (z) in county c
Lending Locally$_{cb2002}$	A dichotomous variable that equals 1 (0 otherwise) if bank b has at least one branch in county c in 2002.
Application Market Share	$\frac{\text{Number of Applications}_{cb2002}}{\text{Number of Applications}_{c2002}} \mid$ Application Status = Approved and Originated
Applicant Income Growth	$\frac{\text{Average Applicant Income}_{cb2006} - \text{Average Applicant Income}_{cb2002}}{\text{Average Applicant Income}_{cb2002}} \mid$ Application Status = Approved and Originated
Loan to Income Growth	$\frac{\text{Average Loan to Income Ratio}_{cb2006} - \text{Average Loan to Income Ratio}_{cb2002}}{\text{Average Loan to Income Ratio}_{cb2002}} \mid$ Application Status = Approved and Originated
Peak-Trough Ratio	$\frac{\text{Home Value Growth}_{z2009}}{\text{Home Value Growth}_{z2006}}$ where $\text{Home Value Growth}_{z2009} = \frac{1}{\mathbb{N}_c} \sum_{z \in c} \frac{\text{Median Home Value}_{z2009} - \text{Median Home Value}_{z2006}}{\text{Median Home Value}_{z2006}}$
Deposit Share$_{cb2002}$	$\frac{\text{Deposits}_{cb2002}}{\text{Deposits}_{b}2002}$

Table 1: **Summary Statistics**

This table presents summary statistics of key variables used in various analyses in this study. *Applications Originated Growth* equals growth in the number of loan originations in 2006 relative to 2002. *Loan Volume Growth* equals growth in the aggregate amount of loans originated in 2006 relative to 2002. *Change in Proportion of Number of Applications Held* equals the change in the proportion of the number of loan originations held by a bank on its balance sheet in 2006 relative to 2002. *Change in Proportion of Loan Volume Held* equals the change in the proportion of originated loan volume held by a bank on its balance sheet between 2006 and 2002. *Lending Locally* is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 2002. *Median Home Value Growth* is growth in the zip-code level median home value index between 2002 and 2006. *Application Market Share* equals a bank's share of the number of loan originations in a county in 2002. *Applicant Income Growth* equals growth in the income of a bank's representative borrower, for whom a loan originates, between 2002 and 2006, and *Loan-to-Income Growth* is defined analogously for loan-to-income ratio. *Lending Locally IV - 1994 Branch Network* is a dichotomous variable that equals 1 if a bank has a branch in a county in 1994. *Lending Locally IV - M&A Branch Network* is a dichotomous variable that equals 1 for all branches that bank A gains due to its acquisition of bank B and equals 0 otherwise.

Variable	N	Mean	SD	p10	p25	p50	p75	p90
Applications Originated	27,954	52.811	223.389	1.000	2.000	7.000	30.000	102.000
Applications Originated Growth	27,954	1.081	3.445	-0.722	-0.500	0.000	1.000	3.313
Loan Volume (Level)	27,954	8,887.244	50,519.570	100.000	245.000	875.000	3,790.000	14,532.000
Loan Volume Growth	27,954	2.589	7.300	-0.647	-0.272	0.447	2.078	6.367
Proportion of Applications Held (Level)	27,954	0.412	0.391	0.000	0.000	0.318	0.829	1.000
Change in Proportion of Number of Applications Held	27,954	-0.078	0.364	-0.548	-0.199	0.000	0.029	0.288
Proportion of Loan Volume Held (Level)	27,954	0.406	0.395	0.000	0.000	0.282	0.830	1.000
Change in Proportion of Loan Volume Held	27,954	-0.062	0.371	-0.566	-0.169	0.000	0.054	0.319
Delinquent (2006-2013)	519,599	0.016	0.126	0.000	0.000	0.000	0.000	0.000
Time to Delinquency (2006-2013)	8,447	67.134	11.575	52.000	59.000	67.000	76.000	83.000
Delinquent (2006-2018)	519,599	0.018	0.134	0.000	0.000	0.000	0.000	0.000
Time to Delinquency (2006-2018)	9,546	74.196	18.456	54.000	62.000	71.000	83.000	98.000
Home Value Growth	27,954	0.341	0.254	0.104	0.156	0.255	0.483	0.755
Lending Locally (1 = Yes, 0 = No)	27,954	0.306	0.461	0.000	0.000	0.000	1.000	1.000
Application Market Share (in %)	27,954	8.583	21.020	0.005	0.019	0.176	3.226	28.947
Applicant Income Growth	27,954	0.320	0.742	-0.349	-0.100	0.163	0.513	1.084
Loan to Income Growth	27,954	0.390	0.810	-0.210	-0.007	0.202	0.513	1.043
Peak-Trough Ratio	27,954	-0.203	0.608	-0.594	-0.360	-0.140	0.063	0.278
Lending Locally IV - 1994 Branch Network (1 = Yes, 0 = No)	27,954	0.128	0.335	0.000	0.000	0.000	0.000	1.000
Lending Locally IV - M&A Branch Network (1 = Yes, 0 = No)	27,954	0.129	0.000	0.000	0.000	0.000	0.000	1.000
Deposit Share in 2002	27,954	0.076	0.222	0.000	0.000	0.000	0.003	0.212
Deposit Share in 1994	27,954	0.056	0.000	0.000	0.000	0.000	0.000	0.036

Table 2: **Within Lender Growth in Loan Originations and Loan Volume: Baseline**
This table reports baseline results for the following within-lender OLS regression specification:

$$\begin{aligned}\text{Outcome}_{cb2006} =& \beta_1(\text{Lending Locally}_{cb2002} \times \text{Home Value Growth}_{c2006}) + \\ & \beta_2 \text{Lending Locally}_{cb2002} + \beta_3 \text{Home Value Growth}_{c2006} + \\ & \Gamma' \text{X}_{cb2006} + \text{Bank}_b + \text{County}_c + u_{cbt}.\end{aligned}$$

The subscripts *b*, and *c* represent a bank, and county, respectively. In Panel A, the dependent variable, *Applications Originated Growth*$_{cb2006}$, equals growth in the number of loan originations in 2006 relative to 2002. In Panel B, the dependent variable is *Loan Volume Growth*$_{cb2006}$, which equals growth in the aggregate amount of loans originated in 2006 relative to 2002. *Lending Locally*$_{cb2002}$ is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 2002. *Home Value Growth*$_{c2006}$ is the average of the growth in the zip code level median home value index between 2002 and 2006. X_{cb2006} is a vector of control variables. *Application Market Share*$_{cbt}$ equals a bank's share of the number of loan originations in a county in 2002. *Applicant Income Growth*$_{cbt}$ equals growth in the income of a bank's representative borrower, for whom a loan originates, between 2002 and 2006, and *Loan-to-Income Growth*$_{cbt}$ is defined analogously for loan-to-income ratio. The standard errors are clustered by county and bank, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)	(2)	(3)
Panel A: Dependent Variable - Applications Originated Growth			
Lending Locally × Home Value Growth	-1.165***	-1.234***	-1.253***
	(-3.061)	(-3.262)	(-3.232)
Lending Locally (1 = Yes, 0 = No)	-0.726***	-0.565***	-0.617***
	(-5.918)	(-4.152)	(-4.902)
Application Market Share		-1.228***	-1.209***
		(-6.746)	(-6.233)
Applicant Income Growth			0.126***
			(2.986)
Loan to Income Growth			0.239***
			(3.873)
R^2	0.272	0.273	0.277
Panel B: Dependent Variable - Loan Volume Growth			
Lending Locally × Home Value Growth	-2.226***	-2.408***	-2.839***
	(-2.612)	(-2.804)	(-3.365)
Lending Locally (1 = Yes, 0 = No)	-1.411***	-0.991**	-0.592*
	(-3.589)	(-2.264)	(-1.913)
Application Market Share		-3.197***	-2.012***
		(-6.962)	(-4.390)
Applicant Income Growth			2.359***
			(13.033)
Loan to Income Growth			2.769***
			(9.731)
R^2	0.286	0.286	0.286
N	29,129	29,129	27,954
County FE	✓	✓	✓
Bank FE	✓	✓	✓
SE Clustered by	Bank and County	Bank and County	Bank and County

Table 3: **Within Lender Growth in Loan Originations and Loan Volume: Deposit Share**
This table reports baseline results under an alternative specification based on deposit share. The subscripts b, and c represent a bank, and county, respectively. In Panel A, the dependent variable, *Applications Originated Growth*$_{cb2006}$, equals growth in the number of loan originations in 2006 relative to 2002. In Panel B, the dependent variable is *Loan Volume Growth*$_{cb2006}$, which equals growth in the aggregate amount of loans originated in 2006 relative to 2002. The *Deposit Share*$_{cb2002}$ is defined as $\frac{\mathbb{D}_{cb2002}}{\mathbb{D}_{b2002}}$, where $\mathbb{D}$ represents bank deposits. *Home Value Growth*$_{c2006}$ is the average growth in the zip code level median home value index between 2002 and 2006. *Application Market Share*$_{cbt}$ equals a bank's share of the number of loan originations in a county in 2002. *Applicant Income Growth*$_{cbt}$ equals growth in the income of a bank's representative borrower, for whom a loan originates, between 2002 and 2006, and *Loan-to-Income Growth*$_{cbt}$ is defined analogously for loan-to-income ratio. The standard errors are clustered by county and bank, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)	(2)	(3)
Panel A: Dependent Variable - Applications Originated Growth			
Deposit Share in 2002×Home Value Growth	-0.687*	-0.735**	-0.673*
	(-1.823)	(-2.034)	(-1.774)
Deposit Share in 2002	-0.719***	0.732***	0.718***
	(-4.287)	(3.785)	(3.483)
Application Market Share		-2.681***	-2.712***
		(-12.988)	(-12.448)
Applicant Income Growth			0.153***
			(3.326)
Loan to Income Growth			0.258***
			(3.886)
R^2	0.261	0.264	0.267
Panel B: Dependent Variable - Loan Volume Growth			
Deposit Share in 2002×Home Value Growth	-2.514**	-2.625***	-2.709***
	(-2.507)	(-2.725)	(-2.840)
Deposit Share in 2002	-1.259***	2.063***	2.202***
	(-3.020)	(4.159)	(4.401)
Application Market Share		-6.140***	-4.751***
		(-12.792)	(-9.760)
Applicant Income Growth			2.397***
			(12.795)
Loan to Income Growth			2.796***
			(9.542)
R^2	0.292	0.296	0.378
N	29,129	29,129	27,954
County FE	✓	✓	✓
Bank FE	✓	✓	✓
SE Clustered by	Bank and County	Bank and County	Bank and County

Table 4: **First Stage of Instrumental Variables Regression Analysis - 1994 Branch Network**
This table presents the first-stage results for the instrumental variable regression analysis of the within-bank differential effect of Lending Locally the historical branch network in 1994. The instrumented variable, *Lending Locally*$_{cb2002}$, is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 2002. The instrument, *Lending Locally*$_{cb1994}$, is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 1994. The standard errors are clustered by county and bank, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)	(2)	(3)
	Dependent Variable - Lending Locally in 2002 (1 = Yes, 0 = No)		
Lending Locally$_{1994}$ (1 = Yes, 0 = No)	0.647***	0.539***	0.529***
	(24.817)	(18.876)	(18.018)
Lending Locally$_{1994}$ x Median Home Value Growth	-0.043	-0.011	0.004
	(-0.686)	(-0.169)	(0.055)
Application Market Share		0.541***	0.524***
		(19.393)	(18.679)
Applicant Income Growth			-0.025***
			(-5.075)
Loan to Income Growth			-0.021***
			(-2.839)
N	29,129	29,129	27,954
County FE	✓	✓	✓
Bank FE	✓	✓	✓
SE Clustered by	Bank and County	Bank and County	Bank and County

Table 5: **Instrumental Variables Regression Analysis - 1994 Branch Network**
This table presents baseline results under the Instrumental Variables Approach. In Panel A, the dependent variable, *Applications Originated Growth*$_{cb2006}$, equals growth in the number of loan originations in 2006 relative to 2002. In Panel B, the dependent variable is *Loan Volume Growth*$_{cb2006}$, which equals growth in the aggregate amount of loans originated in 2006 relative to 2002. *Lending Locally*$_{cb2002}$ is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 2002. *Home Value Growth*$_{c2006}$ is the average growth in the zip code level median home value index between 2002 and 2006. The *instrument* for *Lending Locally*$_{cb2002}$ is a dichotomous variable that equals 1 if a bank has a branch in a county in 1994. *Application Market Share*$_{cbt}$ equals a bank's share of the number of loan originations in a county in 2002. *Applicant Income Growth*$_{cbt}$ equals growth in the income of a bank's representative borrower, for whom a loan originates, between 2002 and 2006, and *Loan-to-Income Growth*$_{cbt}$ is defined analogously for loan-to-income ratio. The standard errors are clustered by county and bank, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)	(2)	(3)
Panel A: Dependent Variable - Applications Originated Growth			
Lending Locally×Home Value Growth	-1.560**	-1.671***	-1.738***
	(-2.512)	(-2.646)	(-2.650)
Lending Locally (1 = Yes, 0 = No)	-0.573***	-0.079	-0.135
	(-3.316)	(-0.399)	(-0.658)
Application Market Share		-1.601***	-1.555***
		(-6.899)	(-6.313)
Applicant Income Growth			0.136***
			(3.138)
Loan to Income Growth			0.247***
			(3.900)
R^2	0.017	0.018	0.023
Panel B: Dependent Variable - Loan Volume Growth			
Lending Locally×Home Value Growth	-3.411***	-3.691***	-4.322***
	(-2.734)	(-2.936)	(-3.277)
Lending Locally (1 = Yes, 0 = No)	-1.033***	0.223	0.417
	(-2.798)	(0.514)	(1.044)
Application Market Share		-4.067***	-2.583***
		(-8.133)	(-4.861)
Applicant Income Growth			2.375***
			(13.066)
Loan to Income Growth			2.783***
			(9.649)
R^2	0.015	0.016	0.128
N	29,129	29,129	27,954
County FE	✓	✓	✓
Bank FE	✓	✓	✓
SE Clustered by	Bank and County	Bank and County	Bank and County
Instrument	Lending Locally based on 1994 Branch Network		

Table 6: **Within Lender Change in Proportion of Applications and Loan Volume Held**
This table presents results for the within-bank differential effect of Lending Locally on the proportion of held loan applications and corresponding aggregate held loan volume. In Panel A, the dependent variable, *Change in Proportion of Application Held*$_{cb2006}$, equals the change in the proportion of the number of applications held by a bank on its balance sheet between 2006 and 2002. In Panel B, the dependent variable is *Held Loan Volume Growth*$_{cb2006}$ equals the change in the amount of the loans held by a bank on its balance sheet between 2006 and 2002. *Lending Locally*$_{cb2002}$ is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 2002. *Home Value Growth*$_{c2006}$ is the average growth in the zip code level median home value index between 2002 and 2006. The standard errors are clustered by county and bank, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)
Panel A: Dependent Variable - Change in Proportion of Number of Applications Held	
Lending Locally×Home Value Growth	-0.071**
	(-2.300)
Lending Locally (1 = Yes, 0 = No)	-0.003
	(-0.239)
R^2	0.463
Panel B: Dependent Variable - Change in Proportion of Loan Volume Held	
Lending Locally×Home Value Growth	-0.071**
	(-2.288)
Lending Locally (1 = Yes, 0 = No)	0.007
	(0.539)
R^2	0.443
N	27,954
County FE	✓
Bank FE	✓
SE Clustered by	Bank and County

Table 7: **Freddie Mac - Loan Level Data Analysis**

The results in this table are based on the loan level data from Freddie Mac's Loan Level Database. Specifically, the results in this table are based on all loans that originate in 2006 and are subsequently sold to Freddie Mac by the originating Lender. In Panel A, the dependent variable is *Delinquent*, which equals 1 (0 otherwise) if a loan is past due for at least 28 days and equals 0 otherwise. In Panel B, the dependent variable is *Time To Delinquency | Delinquent* that equals the loan age (in months) at the time when *Delinquent* flag takes on the value of 1 for the first time during a loan's tenure. The independent variable, *Lending Locally*, is a dichotomous variable that equals 1 (0 otherwise) if a lender has a branch in a county. The *Time* fixed effects in Panel B correspond to the year-month in which *Deliquent* flag takes on the value of 1 for the first time during a loan's tenure. **All specifications include borrower-level *credit score* as a control variable.** The standard errors are clustered by zip code, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)	(2)
Panel A: Dependent Variable - Delinquent (1 = Yes, 0 = No)		
Lending Locally (1=Yes, 0 = No)	0.002**	0.002***
	(2.452)	(2.981)
R^2	0.040	0.042
N	519,599	519,599
Bank FE	Yes	Yes
Zipcode FE	Yes	Yes
SE Clustered by	Zipcode	Zipcode
Time Period	2006-2013	2006-2018
Panel B: Dependent Variable - Time To Delinquency | Delinquent		
Lending Locally (1=Yes, 0 = No)	-0.455**	-0.547***
	(-2.452)	(-3.341)
R^2	0.920	0.969
N	8,447	9,546
Bank FE	✓	✓
Zipcode FE	✓	✓
Time FE	✓	✓
SE Clustered by	Zipcode	Zipcode
Time Period	2006-2013	2006-2018

Table 8: **Peak-Trough Markets - Terciles-Based Regression Analysis**
This table presents the results of the analysis based on the Peak-Trough Markets. In Panel A, the dependent variable, *Applications Originated Growth*$_{cb2006}$, equals growth in the number of loan originations in 2006 relative to 2002. In Panel B, the dependent variable is *Loan Volume Growth*$_{cb2006}$, which equals growth in the aggregate amount of loans originated in 2006 relative to 2002. *Lending Locally*$_{cb2002}$ is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 2002. *Peak-Trough Ratio*$_{c2006}$ equals $\frac{\text{Home Value Growth}_{c2009}}{\text{Home Value Growth}_{c2006}}$, where *Home Value Growth*$_{c2009}$ is average growth in the zip code level median home value index between 2006 and 2009, and *Home Value Growth*$_{c2006}$ is the average growth in the zip code level median home value index between 2002 and 2006. In columns (1), (2), and (3), the results are based on a sub-sample corresponding to the bottom, middle, and top tercile, respectively, of the *Peak-Trough Ratio*. The standard errors are clustered by county and bank, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)	(2)	(3)
	Peak-Trough Ratio Tercile:		
	Bottom	Middle	Top
Panel A: Dependent Variable - Applications Originated Growth			
Lending Locally×Peak-Trough Ratio	-0.153**	-0.960	-0.015
	(-2.063)	(-1.061)	(-0.245)
Lending Locally (1 = Yes, 0 = No)	-1.245***	-1.533***	-1.000***
	(-4.779)	(-7.013)	(-6.143)
R^2	0.310	0.287	0.251
Panel B: Dependent Variable - Loan Volume Growth			
Lending Locally×Peak-Trough Ratio	-0.327**	-2.671	-0.101
	(-2.106)	(-1.381)	(-0.835)
Lending Locally (1 = Yes, 0 = No)	-2.489***	-3.023***	-1.937***
	(-4.016)	(-6.956)	(-7.256)
R^2	0.335	0.326	0.257
N	9,816	9,758	9,551
County FE	✓	✓	✓
Bank FE	✓	✓	✓
SE Clustered by	Bank and County	Bank and County	Bank and County

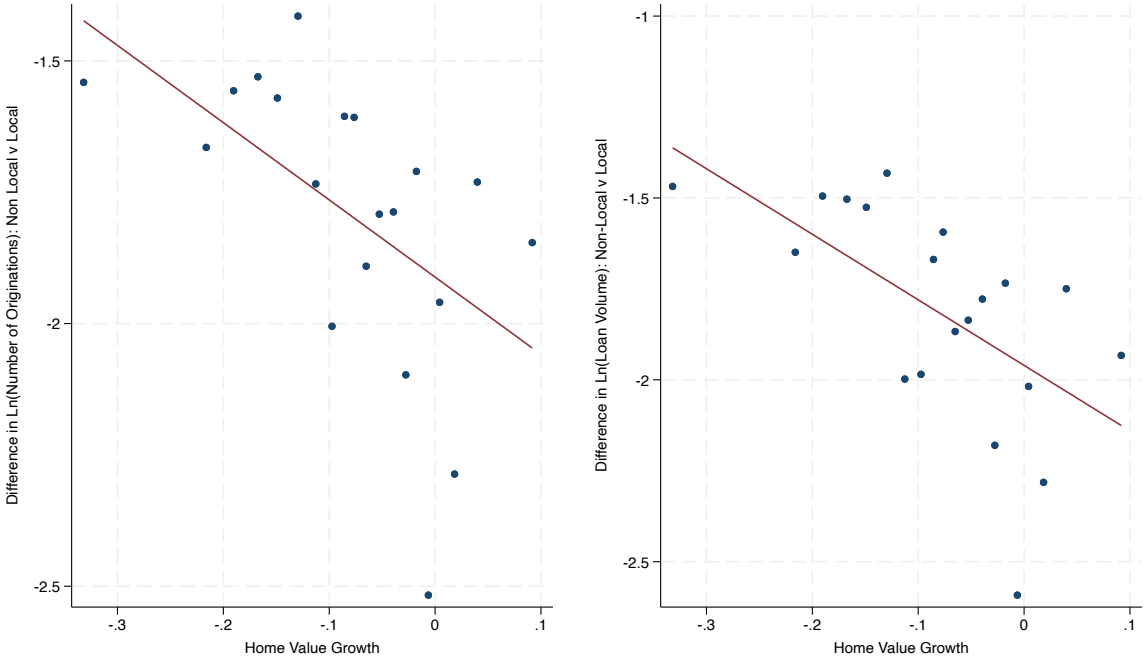


Figure 1: The figure presents a binned scatterplot showing an association between home value growth in 2006 and the difference in the average logarithm of mortgage originations (left panel) and loan volume (right panel) across lending types: local and non-local (*within* bank). The *local* lending corresponds to counties where a bank has at least one branch. The *non-local* lending corresponds to counties where a bank does not have a branch.

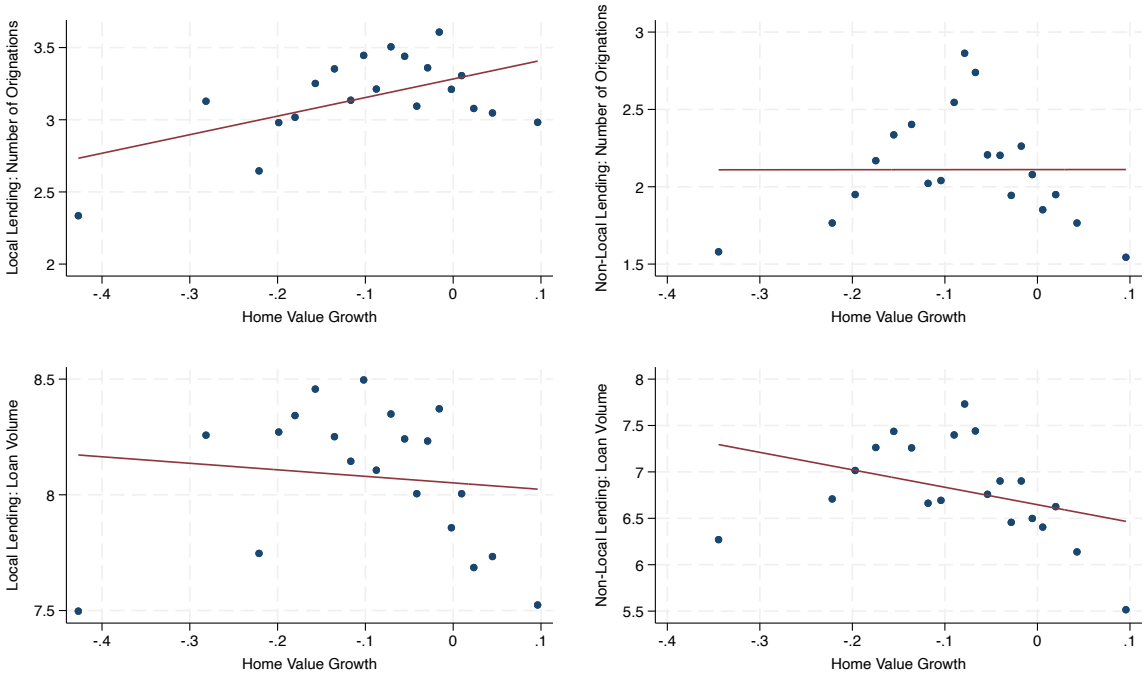
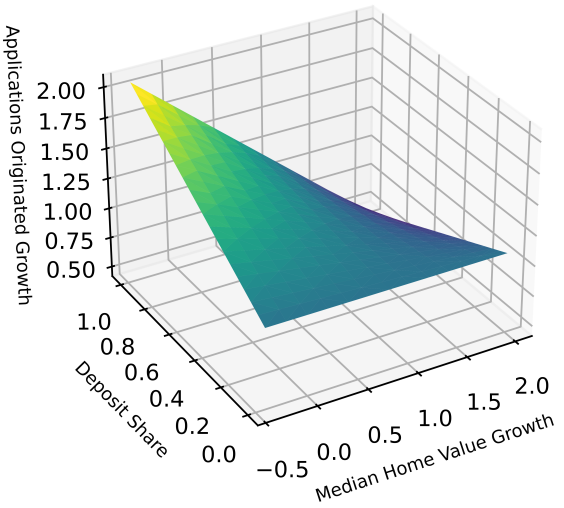
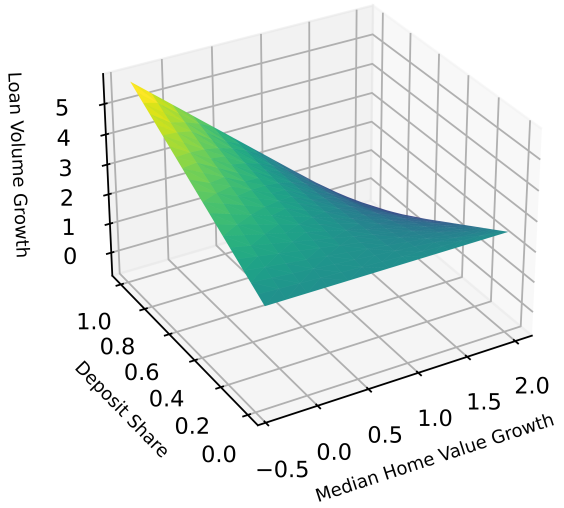


Figure 2: This figure shows how local and non-local lending relate to the growth of home values in 2006. The left panel depicts the association between home value growth, and the logarithm of one plus total number of originations (top left) and the logarithm of one plus total loan volume (bottom left) in counties within banks' branch networks (local lending). Analogous binned scatterplots in the right panel correspond to counties outside banks' branch networks (non-local lending).



(a)



(b)

Figure 3: This figure presents margins plots of regression results with Applications Originated Growth and Loan Volume Growth in 2006 relative to 2002 as dependent variables in Panel (a) and (b), respectively. *Deposit Share* is defined as the total deposits of a county-bank as a fraction of the total deposits of a bank in 2002. *Home Growth* equals the average growth in the zip code level median home value index between 2002 and 2006 in a given county.

Internet Appendix

Informational Advantages of Lending Locally

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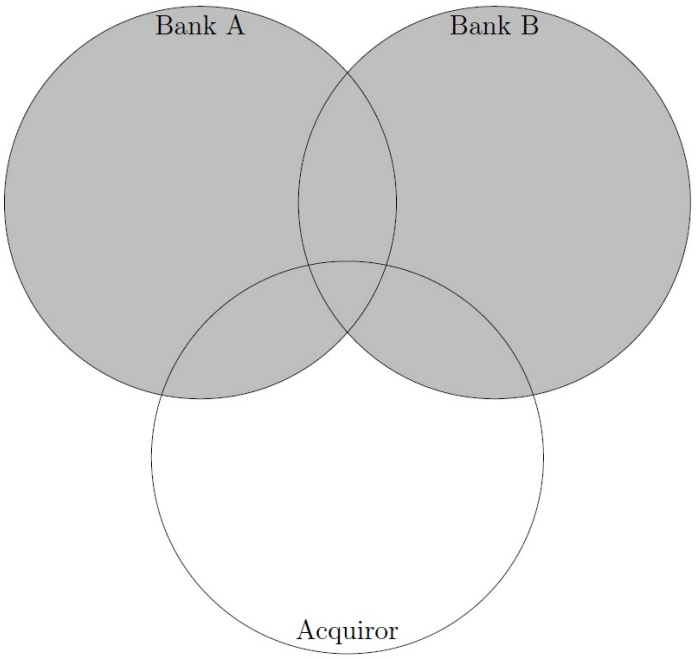

Figure A.1: The figure presents the intuition behind the Mergers and Acquisitions based instrumental variable used in Tables A.1 and A.2. Let {Acquiror} (bottom circle), {Bank A} (top left circle), and {Bank B} (top right circle) represent the set of counties in which Acquiror bank, Bank A, and Bank B, respectively, has branch presence. Say, Acquiror bank buys Bank A in year t and Bank B in t', where $1994 \leq t, t' \leq 2001$. In 2002, the total branch network of Acquiror bank is represented by {Acquiror}$\cup${Bank A}$\cup${Bank B} and instrumented by {Bank A}$\cup${Bank B}.

Table A.1: **First Stage of Instrumental Variables Regression Analysis - M&A Activity Based Branch Network**

This table presents the first-stage results for the instrumental variable regression analysis of the within-bank differential effect of Lending Locally using M&A Activity. The instrumented variable, *Lending Locally*$_{cb2002}$, is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 2002. The *instrument* for *Lending Locally*$_{cb2002}$ is a dichotomous variable based on a bank's M&A activity. This variable equals 1 for the branch network that the acquiring bank incrementally gains from acquiring another bank. The standard errors are clustered by county and bank, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)	(2)	(3)
	Dependent Variable - Lending Locally in 2002 (1 = Yes, 0 = No)		
Lending Locally Based on the Incremental Branch Network due to M&A Activity	0.687***	0.669***	0.662***
	(24.146)	(22.918)	(22.588)
N	29,129	29,129	27,954
County FE	✓	✓	✓
Bank FE	✓	✓	✓
SE Clustered by	Bank and County	Bank and County	Bank and County

Table A.2: **Instrumental Variables Regression Analysis - M&A Based Branch Network**
This table presents baseline results under the Instrumental Variables Approach. In Panel A, the dependent variable, *Applications Originated Growth*$_{cb2006}$, equals growth in the number of loan originations in 2006 relative to 2002. In Panel B, the dependent variable is *Loan Volume Growth*$_{cb2006}$, which equals growth in the aggregate amount of loans originated in 2006 relative to 2002. *Lending Locally*$_{cb2002}$ is a dichotomous variable that equals 1 (0 otherwise) if a bank has a branch in a county in 2002. *Home Value Growth*$_{c2006}$ is the average growth in the zip code level median home value index between 2002 and 2006. The *instrument* for *Lending Locally*$_{cb2002}$ is a dichotomous variable based on a bank's M&A activity. This variable equals 1 for the branch network that the acquiring bank incrementally gains from acquiring another bank. *Application Market Share* $_{cbt}$ equals a bank's share of the number of loan originations in a county in 2002. *Applicant Income Growth*$_{cbt}$ equals growth in the income of a bank's representative borrower, for whom a loan originates, between 2002 and 2006, and *Loan-to-Income Growth*$_{cbt}$ is defined analogously for loan-to-income ratio. The standard errors are clustered by county and bank, and t-statistics are presented in parentheses. Significance levels: * p < 0.10, ** p < 0.05, *** p < 0.01.

	(1)	(2)	(3)
Panel A: Dependent Variable - Applications Originated Growth			
Lending Locally×Home Value Growth	-1.585***	-1.589***	-1.650***
	(-3.007)	(-3.016)	(-3.002)
Lending Locally (1 = Yes, 0 = No)	-1.180***	-1.167***	-1.209***
	(-6.508)	(-6.325)	(-7.139)
Application Market Share		-0.474**	-0.467**
		(-2.310)	(-2.213)
Applicant Income Growth			0.107***
			(2.595)
Loan to Income Growth			0.225***
			(3.833)
R^2	0.013	0.013	0.018
Panel B: Dependent Variable - Loan Volume Growth			
Lending Locally×Home Value Growth	-3.012**	-3.025**	-3.767***
	(-2.428)	(-2.436)	(-3.160)
Lending Locally (1 = Yes, 0 = No)	-2.229***	-2.182***	-1.607***
	(-3.011)	(-2.887)	(-3.063)
Application Market Share		-1.735***	-0.661
		(-2.692)	(-1.169)
Applicant Income Growth			2.324***
			(12.967)
Loan to Income Growth			2.744***
			(9.891)
R^2	0.012	0.013	0.124
N	29,129	29,129	27,954
County FE	✓	✓	✓
Bank FE	✓	✓	✓
SE Clustered by	Bank and County	Bank and County	Bank and County
Instrument	Incremental Branch Network due to M&A Activity		