

Result of the first-stage regression is presented in Table 1.3 Column (1). I also repeat the same exercise by replacing the house price volatility from 1982 to 1996 with the house price volatility from 2000 to 2011. Results in columns (1)-(3) show that, consistent with Glaeser, Gyourko and Saiz (2008), the inelasticity of housing supply predicted strongly the volatility of the local house price both for the 1982-1996 and the 2000-2011 housing cycles. In column (4), I regress the wage growth from 2000 to 2005 on housing supply inelasticity where the correlation is very weak and statistically insignificant. This means that it is unlikely that the economic fundamentals were significantly different for counties with different housing supply inelasticities. These relationship were further illustrated in Figures 2 and 3. In Figure 2 and Panel A of Figure 3, I plot the detrended house price from 1982 to 1996 and the house price index from 1988 to 2011 of quintiles of CBSA areas by housing supply elasticities.

Alternatively, for robustness, I also construct the house price cyclical measure following Palmer (2014), which is defined as $\sigma_i = \left(\frac{1}{T-1} \sum_{t=1}^T (\Delta HP_{it} - \Delta \bar{HP}_i)^2 \right)^{1/2}$ for CBSA i and time ranges from 1982 to 1996 at the quarterly frequency. This measure captures how house price moves in the local area relative to its long-run trend. Robustness checks treating this measure as exogenous are also presented in later sections.

1.4.3. Lending Standards, House Price Volatility and Bank Competition

In this section, I present the main empirical analysis using the predicted house price volatility obtained from the previous first-stage regressions.

1.4.3.1. Empirical Model

According to the theoretical model, banks have the incentive to lower lending standards (e.g., raising the loan-to-income ratio) when faced with volatility in the local house price. Moreover, this incentive would be the strongest in markets where bank competition is high. A higher concentration of the local mortgage market would be associated with less risk taking behaviors in response to volatility in the house price. To formally test this hypothesis, one would perform the following regression.

$$(1) \Delta LoanRisk_i^{2000-2005} = \beta_0 + \beta_1 HPV_{ol_i} + \beta_2 HPV_{ol_i} \times Concentration_i + \beta_3 Concentration_i + \beta_4 X_i + \epsilon_i$$

Note that by construction, this measure $HPVol$ can be negative when the growth in house price from 1996 to 1989 exceeds the growth from 1982 to 1989. Such low values of $HPVol$ indicate exactly the case where the house price had low volatility in the national housing cycle and there was no apparent housing bubble in those areas.

Seeded Content – **History of The 30 Year Mortgage – From Historic Rates To Present Time** <https://bebusinessed.com/history/history-of-mortgages/>

1970s and the creation of Freddie Mac

As Baby Boomers grew older, their housing demands increased. They wanted to purchase larger and more expensive homes. Unfortunately, the mortgage market didn't quite have enough capital available to finance the needs of these homebuyers.

That's where Freddie Mac comes in. In 1970, the U.S. Congress created an organization called the Federal Home Loan Mortgage Corporation (FHLMC). Today, we know that organization as Freddie Mac. The organization was designed to increase the amount of financial capital available to mortgage lenders and, by extension, borrowers.

To do that, Freddie Mac operated in a similar way to Fannie Mae. The organization purchased mortgages from lenders, giving them more capital to spend on more mortgages. Freddie Mac is also well-known for offering 30 year fixed-rate mortgages, giving buyers the opportunity to lock in a mortgage at a lower interest rate in order to hedge their bets against rising interest rates in the future.

At the same time, interest rates were rapidly rising. Interest rates rose sharply throughout the 1970s and 1980s and eventually rose above 20%. In previous years, lenders were happy to provide mortgages with 20 to 30 year periods, but during this period of exceptionally high interest rates, most mortgages included 1 year, 3 year, or 5 year terms. It wasn't until the late 1990s that interest rates finally fell below 7%.

In 1972, Fannie Mae and Freddie Mac both began to purchase conventional mortgages that were not guaranteed or insured by the FHA or VA. Instead of seeking approval from the FHA or VA, loans could be insured by Private Mortgage Insurance (PMI) companies.

1980s and adjustable rate mortgages

Adjustable rate mortgages (ARMs) were a product of the 1980s. Prior to the 1980s, buyers were restricted to fixed-rate mortgages which featured a fix rate throughout the term of the loan.

Adjustable rate mortgages were the opposite: interest rates reset over the course of the mortgage.

Homebuyers may have signed their mortgage when interest rates were at 20% and then reaped the benefits of their ARM when interest rates dropped to 5% a decade later.

Unfortunately, ARMs also created an opportunity for predatory lenders. ARMs often featured attractive introductory interest rates designed to entice homebuyers into signing up for a mortgage. Then, once that initial low-interest rate period was over, homebuyers were faced with more difficult interest rates and often defaulted on their loans.

The Federal Housing Enterprises Financial Safety and Soundness Act of 1992

FHEFSSA is a mouthful. It stands for the Federal Housing Enterprises Financial Safety and Soundness Act, which was passed in 1992 and designed to increase government oversight of the mortgage industry.

The FHEFSSA created the Office of Federal Housing Enterprise Oversight (OFHEO). That Office held some authority over Fannie Mae and Freddie Mac and also established minimum capital standards for both companies.

Unfortunately, those capital standards were criticized for being too low. In fact, Fannie Mae and Freddie Mac had approximately one fifth of the capital requirements of other financial institutions, which means they would be unable to cover their losses as well as other institutions during times of crisis. As government-funded companies, this meant taxpayers would have to bail out both companies in a time of crisis – which is exactly what happened during the Great Recession.

1990s and the effort to increase home ownership rates

The high interest rates of the 1990s discouraged people from buying homes. Who could afford to pay for a mortgage with a 20% interest rate?

The U.S. government decided to increase American home ownership to 70%. One of the best ways to do that was to reduce mortgage requirements and encourage subprime lending. During this period, subprime

mortgages increased from \$35 billion to \$125 billion and millions of people who were not really qualified to buy homes became homeowners.

At the same time, Wall Street and lenders in the financial industry created attractive mortgage products designed to attract new homebuyers. Those products included “80/20” loans. Typically, mortgages with a Loan-to-Value above 80 would be required to pay mortgage insurance. To avoid this costly insurance, homebuyers could create two mortgages: an 80% first mortgage and a 20% second mortgage.

However, one of the worst and most predatory mortgage products created during this period was the option ARM loan. An option ARM loan was an adjustable rate loan which contained multiple repayment options. These loans often featured repayment options where buyers owed more at the end of each month than they did at the beginning. Low monthly payments sounded attractive but borrowers were eventually stuck with extremely large mortgages they could not afford.

Ultimately, these factors achieved the government’s goal of increased home ownership across the country. Unfortunately, that increased home ownership would come at a high price.

The Great Recession

The years leading up to the “Great Recession” of 2008 and 2009 were a great time for mortgage companies. Unfortunately, the good times didn’t last long.

The Great Recession was caused by a number of different factors, including a U.S. housing bubble which peaked in July 2006, subprime lending, and a lack of liquidity.

The U.S. housing bubble had generally remained stable throughout modern U.S. history before reaching an astronomical high in July 2006. By late 2006 and 2007, housing prices had declined and in 2008, the bubble finally burst as home price indexes across the country reported record-breaking price drops. This was seen as being the primary cause of the Great Recession.

At the same time, subprime mortgage lenders – fuelled by a lack of regulation – happily gave out mortgages to virtually anyone who asked. These lenders were accused of using predatory techniques to lure unqualified homebuyers into purchasing a mortgage for a home that they could never hope to afford.

Many homebuyers defaulted on their subprime mortgages. At the same time, the housing bubble had burst, which meant that homebuyers were paying for mortgages that were worth far more than the actual value of the home, encouraging them to default.

All of these factors combined to create the phenomenon we know as the Great Recession. The combination of predatory lending, subprime mortgages, and the housing bubble created the worst economic recession of our time.

Fannie Mae and Freddie Mac under government receivership

In September of 2008, both Fannie Mae and Freddie Mac were placed under government receivership. The government was then responsible for all outstanding mortgages that had been purchased or guaranteed by both companies – a total of \$6 trillion dollars' worth of mortgages (\$12 trillion dollars in outstanding mortgages existed in the United States at the time).

The government takeover of Fannie Mae and Freddie Mac cost American taxpayers billions of dollars. The bailout is estimated to have cost around \$200 billion and only a fraction of that loan has been repaid.

The bailout of Freddie Mac and Fannie Mae forced many people to rethink the modern American mortgage. America simply cannot afford to have another Great Recession.

Today, mortgages are more difficult to obtain than they were before the Great Recession. In order to prevent another mortgage catastrophe, buyers need to be educated about their mortgages and terms. At the same time, the US must reduce predatory lending and regulate the mortgage industry to prevent irresponsible behavior by private financial companies.

where $\Delta LoanRisk_i^{2000-2005}$ is the change in loan riskiness measure in county i from 2000 to 2005, $HPVol_i$ is the house price volatility predicted from the first stage regression, $Concentration_i$ is the county-level mortgage market concentration and X_i is a list of county controls. Regressions are all weighted by county population as of 2000 and standard errors are clustered at the CBSA level. For the depend variable, I mainly use two measures at the county level constructed using loan-level data: the loan-to-income ratio and the acceptance rate. The 2000-2005 change in the loan-to-income ratio is the change in natural log from 2000 to 2005 for each county's average loan-to-income ratio²⁴. To compute the acceptance rate (i.e., one minus the denial rate) in a given year for a county, I divide the total number of loans approved in that county by the total number applications in that county for that year. The 2000-2005 is just the difference between the 2005 and the 2000 acceptance rates for that county. The loan-to-income ratio follows more closely with the theoretical model as it measures the exposure to future house price volatility more directly. For the measure of bank concentration, I use the top-10 Concentration Ratio and leave the results using the Herfindahl index to the robustness section. Alternative, I also measure loan riskiness by the loan-to-value (LTV) ratio and the fraction of high-rate-spread loans, and measure bank concentration using the Herfindahl index (HHI). Results of these alternative measures are included in the robustness section as well.

$$(1a) \Delta \ln LTI_i^{2000-2005} = \beta_0 + \beta_1 HPVol_i + \beta_2 HPVol_i \times Concentration_i + \beta_3 Concentration_i + \beta_4 X_i + \epsilon_i$$

$$(1b) \Delta AccRate_i^{2000-2005} = \beta_0 + \beta_1 HPVol_i + \beta_2 HPVol_i \times Concentration_i + \beta_3 Concentration_i + \beta_4 X_i + \epsilon_i$$

The theoretical model has direct predictions on the signs of coefficients β_1 and β_2 . The coefficient β_1 on the level term of house price volatility would be positive, indicating that lending standards would be lowered if house price volatility increases. The key coefficient of interest is β_2 on the interaction term between house price volatility and bank concentration. The theoretical prediction implies a negative β_2 , meaning that the tendency to lower lending standards in response to house price volatility would decrease as the mortgage market becomes more concentrated (i.e., less competition).

The theoretical risk-shifting framework has even sharper implications. Since the competition effect on risk taking behavior goes through banks' balance sheet, we would see also see different estimates of β_1 and β_2 for banks that are affected by local

²⁴Change in the loan-to-income ratio itself instead of $\ln(LTI)$ can be used and results are similar.

competition differently. In particular, the effect of local competition would be particularly strong for lending decisions made by small and regional banks, but should be much less significant for national banks that had a large portfolio across many states. That is to say, we would see a much stronger estimate for β_2 for small and local banks than for national banks. To formally test this, I construct separately the change in lending standards of loans issued by local/regional banks and those issued by national banks, where I define national banks as those that had mortgage lending activities in more than fifteen states as of 2000 and local/regional banks as the rest²⁵. I then run the above regression separately for local and regional banks and for national banks separately. The difference in coefficients is also tested by the inclusion of an indicator variable $1\{\text{National Bank}\}$ representing the observation is the change in lending standards by national banks and its interaction with other variables. To rule out the possibility that there has been compositional changes between mortgages issued by small banks and by large banks, I look at the evolution of the share of national banks at the county level by computing the quartiles of a total of 3185 counties according to their Concentration Ratio as of 1995. The share of national banks increased after the 1995 for all groups of counties, partly due to the wave of bank mergers after the Riegle-Neal Act of 1994. After 2000, the share of national banks remained stable and exhibited similar patterns across the four quartiles of counties by bank competition, suggesting that the differential in coefficients would not be a result of the different compositional change in customers between local/regional banks and national banks.

1.4.3.2. Main Regression Results

Results on the loan-to-income ratio are reported in Table 1.4. In columns (1)-(3), the dependent variable is the 2000-2005 (natural-log) change in the loan-to-income ratio for mortgage loans issued by *local* and *regional* banks. One can see that the estimate of β_1 on local house price volatility is positive and the estimate of β_2 is significantly negative. This suggests that local and regional banks responded to volatility in the house price by lowering lending standards (i.e., increasing the loan-to-income ratio), and such response was very strong in competitive mortgage markets but weak in concentrated markets. For the most concentrated mortgage markets where the concentration ratio is above 0.8, the correlation between house price volatility and the change in lending standards is close to zero. In these regressions, I also control for

²⁵I define banks that issued mortgage loans in more than fifteen states and the total number of loans exceeded 10,000 reported in HMDA database as of 2000. The rest of the banks and new entrants are defined as local and regional banks. Results are robust to defining national banks as issuing in more than ten or twenty states.

real economic factors (e.g., the change in wages and employment) and mortgage market variables (e.g., the share of securitization and thrift institutions). We can see that the regression results are robust to the control of various factors.

In columns (4)-(6), I repeat the same exercise but replace the dependent variable with the 2000-2005 (natural-log) change in the loan-to-income ratio for mortgages issued by *national* banks. We see that the coefficient β_2 becomes much weaker in statistical significance. In column (6) where I control for various factors, we see that the estimate on β_2 becomes insignificant, indicating that the change in lending standards by national banks is not significantly affected by local competition. To formally test the differential in the estimates of β_2 between local/regional banks and national banks, I include both observations for local banks and those for national banks and interact these coefficients of interest with an indicator variable $1\{\text{National Bank}\}$. In column (7), we see that the coefficient on the interaction term ($\text{HPVol} \times \text{Concentration}$) has an estimate of -8.36 and is highly significant statistically. Moreover, the coefficient on the term ($\text{HPVol} \times \text{Concentration} \times 1\{\text{National Bank}\}$) has an estimate of 4.48 and is also statistically significant, suggesting that for national banks the coefficient β_2 is reduced by more than half. In column (8) where I also include various controls, we can see that for national banks the estimate of β_2 (-6.32) is reduced by more than two thirds (4.48). This exercise confirms that the differential in estimates of β_2 for national banks versus local banks is highly significant, both statistically and economically.

Table 1.5 reports the regression results on the change in the acceptance rate. In columns (1)-(3), the dependent variable is the 2000-2005 change in acceptance rate for loan applications of local and regional banks. A higher acceptance rate indicates laxer lending standards. One can see that the coefficient β_1 on house price volatility is positive and the coefficient β_2 on the interaction term ($\text{HPVol} \times \text{Concentration}$) is negative and statistically significant. This implies that higher bank concentration reduces the incentive of local banks to respond to local house price volatility, a prediction from the theoretical model. In terms of magnitude, when bank concentration reaches 0.8 (i.e., the highest quintile), the response to house price volatility is close to zero, a result almost identical to the analysis above using the loan-to-income ratio as the measure for loan riskiness. In columns (4)-(6), I replace the dependent variable with the 2000-2005 change in the acceptance rate for mortgage applications by national banks. In this exercise, the coefficients β_1 and β_2 both become statistically insignificant, meaning that the loan approval decisions made by national banks were minimally affected by either local house price volatility or local bank competition. In

columns (7)-(8), I formally test the differential in these coefficients. The coefficient on $(\text{HPVol} \times \text{Concentration} \times 1\{\text{National Bank}\})$ is 1.81 which wipes out most of the effect of β_2 on the term $(\text{HPVol} \times \text{Concentration})$ (-2.79 or -2.20).

In sum, this section presents regression results on the relationship among the change in lending standards, house price volatility and local mortgage market competition, where the change in lending standards is measured by the natural-log change in loan-to-income ratio from 2000 to 2005 or the change in acceptance rate. The findings in this analysis show that lending standards were substantially lowered in response to volatility in the local house price for high-competition markets. More importantly, this competition effect only mattered for the lending decisions made by local and regional banks, but was insignificant for national banks. These results are very consistent with the theoretical predictions.

1.4.3.3. Combining National and Local Banks

Given the strong differential in the effect of local bank competition between national banks and local banks, I also check if the overall effect of bank competition is still significant. To formally show this, I combine national and local banks together for each county and perform regressions (1a) and (1b).

Table 1.6 reports the regression results. In columns (1)-(3) of Table 1.6, I use the 2000-2005 *percentage* change in the loan-to-income ratio for the county as the dependent variable. One can see that the coefficient β_1 on house price volatility is positive and the coefficient β_2 on the interaction term between house price volatility and bank concentration is strongly negative. This means that the relationship between the relax of lending standards and house price volatility diminishes as the market becomes concentrated. This competition effect is robust to the inclusion of various controls. In columns (4)-(6), I repeat the same exercise but replace the dependent variable with the change in *value* of the loan-to-income ratio, instead of the percentage change. We can see that very similar patterns can be obtained where $\beta_1 > 0$ and $\beta_2 < 0$. For the change in acceptance rate, columns (7)-(8) report the regression results. One can see again that a high bank concentration can reduce the response of the acceptance rate to house price volatility entirely.

The results for the regressions combining both national and local banks suggest that in the aggregate, we also see strong effects of bank competition in inducing stronger response to house price volatility. One standard-deviation increase in the predicted house price volatility ($s.d. \approx 0.05$) is associated with at least a 10% or 0.20 increase

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