Credit Supply Shocks and Housing Markets

Chao Liu*

July 28, 2022

In this note, I summarize four credit supply shocks used in previous literature and apply them to estimate the effect of credit supply on housing markets. In particular, I provide evidence of the effect on housing liquidity.

I Positive Subprime Shock: APL Preemption

Di Maggio and Kermani (2017) uses a shock to national banks to estimate the effect of the supply of credit on the real economy. From 1999, several states adopted antipredatory-lending laws (APL) which placed limits on the mortgage loan terms for higher-risk borrowers. However, in 2004, aiming to boost homeownership, the Office of the Comptroller of the Currency (OCC) introduced a preemption regulation. This regulation effectively exempted national banks and their mortgage lending affiliates from state APLs and their enforcement. On the other hand, mortgage brokers and independent nondepository lenders, as well as state-chartered depository institutions and their subsidiaries, were still required to comply.

The identification strategy is to compare housing market outcomes in areas with and without APLs before and after the OCC preemption rule was enacted. In particular, APL-state areas in which a large proportion of loans were originated by national banks before 2004 experienced a positive credit supply shock in the wake of the OCC regulation. Figure 1 shows the substantially uneven presence of national banks in different counties as reflected in the proportion of loans they originated before the law change.

*Liu: Kellogg School of Management, Northwestern University. Email: chao.liu1@kellogg.northwestern.edu.

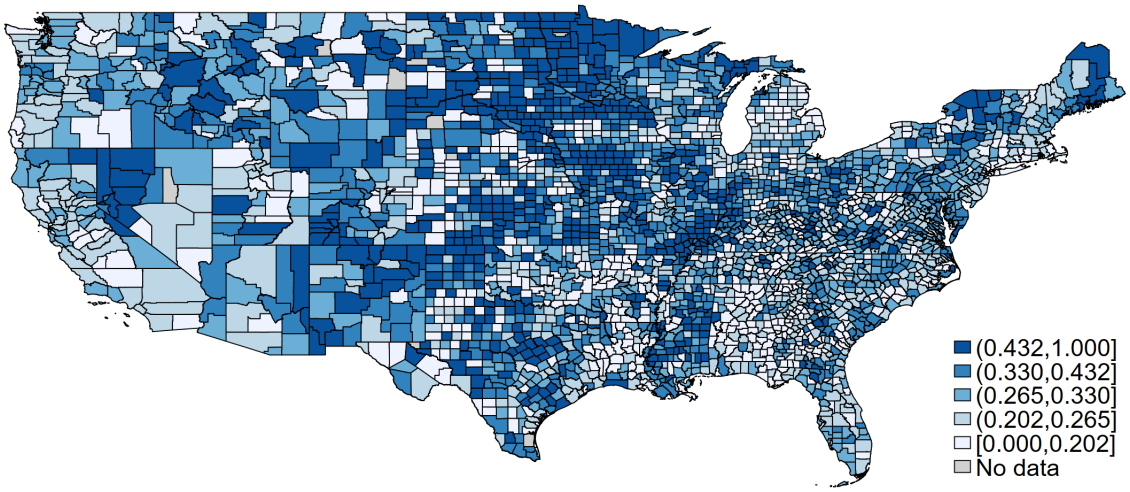

Figure 1. Fraction of Lending Done by National Banks in 2003

I exploit this positive subprime credit shock using the following model:

$$\begin{aligned}\log\left(\mathrm{Y}_{i,t}\right) =& \lambda_i + \eta_t + \sum_{k\neq 2003} \beta_{1k} APL_{i,2004}\mathbf{1}_{(t=k)} + \sum_{k\neq 2003} \beta_{2k} OCC_{i,2003}\mathbf{1}_{(t=k)} \\ &+ \sum_{k\neq 2003} \beta_{3k} APL_{i,2004} * OCC_{i,2003}\mathbf{1}_{(t=k)} + \Gamma X_{i,t} + \varepsilon_{i,t}\end{aligned} \tag{1}$$

where i and t denote CBSA and year. $APL_{i,2004}$ equals one if CBSA i has an antipredatory-lending law in place by 2004 and zero otherwise, while $OCC_{i,2003}$ is the fraction of purchase loans originated by OCC lenders in 2003. λ_i and η_t are CBSA and year fixed effects. $X_{i,t}$ include housing supply elasticity from Saiz (2010) interacted with a series of year dummy variables (i.e., $\mathbf{1}_{(t=k)}$).

I use Zillow Home Value Index (ZHVI) to calculate the housing price growth and Multiple Listing Service (MLS) to calculate the number of new listings at the CBSA level. Figure 2 plots β_{3k} from the estimation of Equation (1). This figure shows that a positive subprime credit supply shock boosts housing price growth and new listings while reducing days on the market. Moreover, since this shock particularly to riskier borrowers, the effect is larger on the bottom-tier housing market.[1]

[1]Top-tier housing markets include homes that have values within the 65th to 95th percentile range for a given region, and bottom-tier housing markets include homes that have values within the 5th to 35th percentile range for a given region.

Figure 2. Results Using Di Maggio and Kermani (2017) Shock

II Positive General Shock: Bank Deregulation

Favara and Imbs (2015) exploits bank branch deregulation to study the effect of credit supply on housing prices. The deregulation waves culminated in 1994 with the passage of the Interstate Banking and Branching Efficiency Act (IBBEA). Banks could then operate across state borders without any formal authorization from state authorities. While the IBBEA authorized free interstate banking, it also granted individual states some latitude in deciding the rules governing entry by out-of-state branches. The IBBEA gave states the right to oppose out-of-state branching by imposing restrictions on: (i) de novo branching without explicit agreement by state authorities; (ii) the minimum age of the target institution in case of mergers; (iii) the acquisition of individual branches without acquiring the entire bank; (iv) the total amount of statewide deposits controlled by a single bank or bank holding company. Rice and Strahan (2010) compute a time varying index that records these restrictions on interstate branching. Their index runs from 1994 to 2005 and takes values between 0 and 4; the index is reversed so that high values refer to deregulated states. Figure 3 illustrates the geographic dispersion of the Rice and Strahan (2010) branching

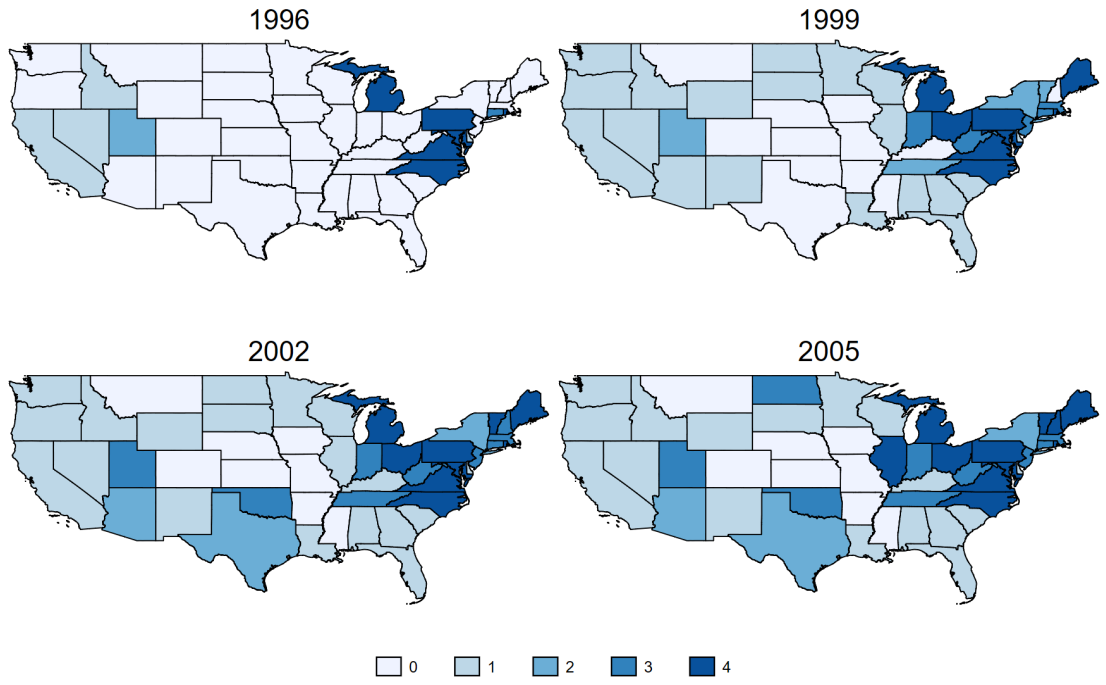

Figure 3. Deregulation Index (1996-2005)

deregulation index over three-year intervals.

I use a reduced-form local projection method to estimate the effect of a positive general credit supply shock on housing markets. In particular, I estimate

$$\ln L_{c,t+i} - \ln L_{c,t+i-1} = \beta_1^{(i)} D_{s,t-1} + \beta_2 \mathbf{X}_{c,t} + \alpha_c + \gamma_t + \varepsilon_{c,t} \tag{2}$$

where c s, and t index counties, states, and years. $D_{s,t-1}$ is the one-year lagged deregulation index, which aggregates the four elements of deregulation to interstate branching compiled by Rice and Strahan (2010). $\beta_1^{(i)}$ captures the effect of deregulation at horizon i. $X_{c,t}$ summarizes time-varying county-specific controls, that include: the (current and lagged) log changes in income per capita, population, and the Herfindahl index of loan origination. α_c and γ_t are county and year fixed effects. Except days on the market, other data come from the replication package provided by Favara and Imbs (2015).

Figure 4 shows the impulse responses to branching deregulation shocks in the housing market. The positive effect of deregulation on housing prices is long-lasting, which remains significant even five years after the shock. Loan origination imme-

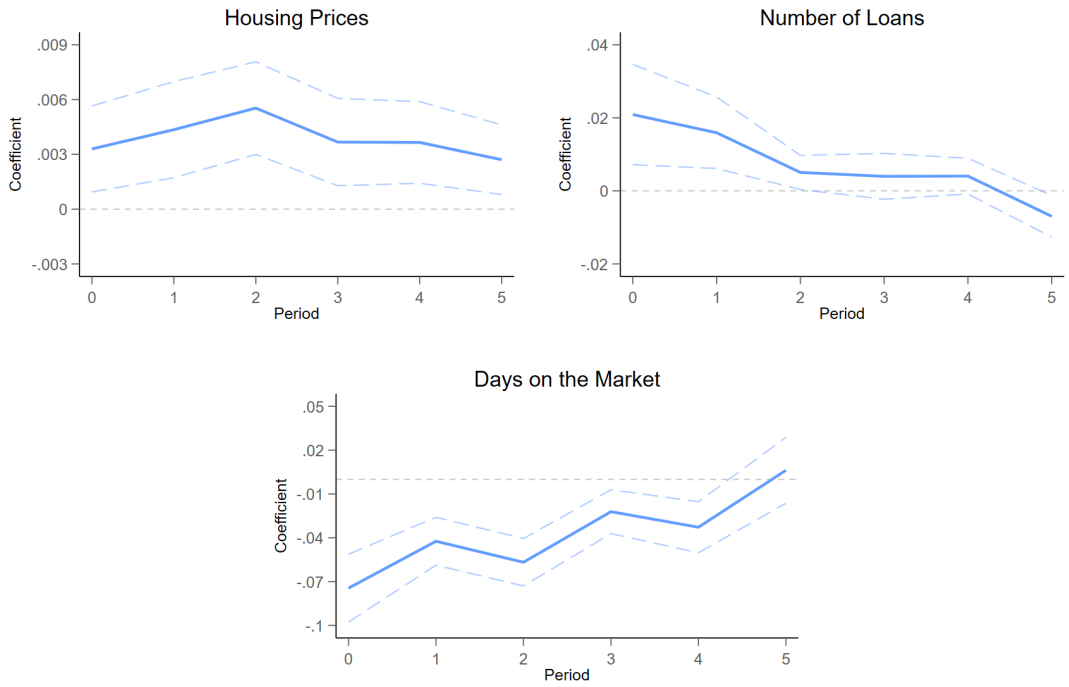

Figure 4. Results Using Favara and Imbs (2015) Shock

diately rises, but returns to its original level after two years. Deregulation has a temporary positive effect on housing liquidity: days on the market significantly drop in the first four years after the shock.

III Positive Subprime Shock: PLS Expansion

Mian and Sufi (2022) use the rise in the private-label mortgage securitization (PLS) market to study the relationship between credit supply and housing speculation. The rise of the PLS market led non-core-deposit-financed lenders (high NCL lenders) to increase mortgage originations starting in 2003. NCL is defined as one minus the ratio of core deposits to total liabilities, where core deposits are defined as FDIC insured deposits. Figure 5 plots total mortgage originations and home purchase mortgage originations separately for high and low NCL lenders. There was almost no difference in mortgage origination between the two types of lenders prior to 2003. However, starting in 2003, high NCL lenders expanded mortgage supply by more.

To analyze the impact on local housing markets, the exposure to the expansion of the PLS market is calculated as the average of the 2002 NCL ratios of mortgage

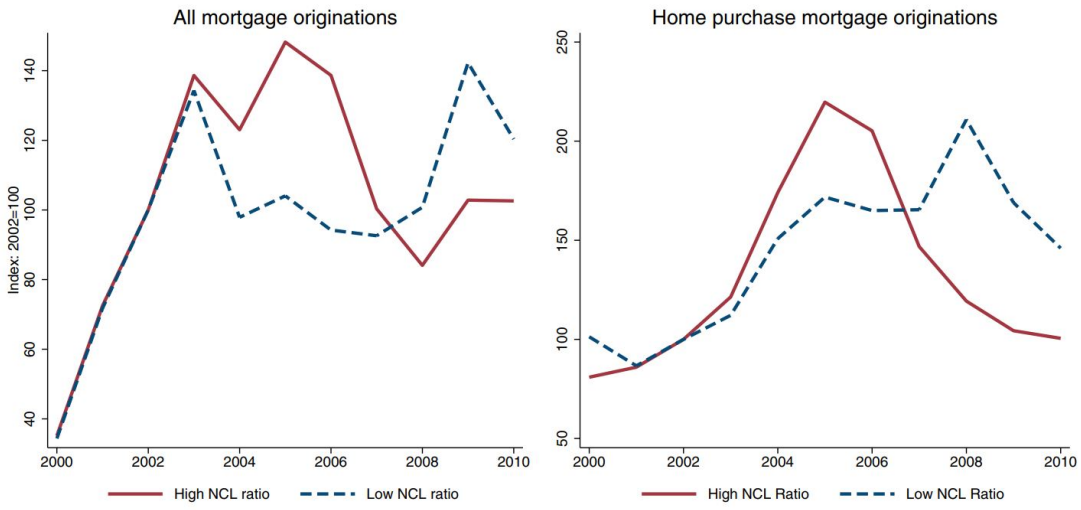

Figure 5. Mortgage Origination by Dependence on NCL

lenders ZIP code z, where the average is weighted by a lender's amount of mortgage originations in 2002. More specifically,

$$\text{NCL Share}_{z,2002} = \sum_b \omega_{z,b,2002} \times NCL_{b,2002}$$

where

$$\omega_{z,b,2002} = \frac{\text{Originations}_{z,b,2002}}{\sum_b \text{Originations}_{z,b,2002}}$$

I then estimate the following equation:

$$\log\left(\text{Y}_{z,t}\right) = \lambda_z + \eta_t + \sum_{k \neq 2002} \beta_k \text{NCL Share}_{z,2002} \mathbf{1}_{(t=k)} + \varepsilon_{z,t} \tag{3}$$

where λ_z and η_t are ZIP code and year fixed effects.

Figure 6 shows an increase in housing prices and the volume of housing transactions and a decrease in days on the market from 2003 to 2006 in high NCL share ZIP codes. Since the 2002 NCL share is strongly correlated with the share of subprime borrowers, the expansion of PLS market had a larger effect on bottom-tier housing markets.

Figure 6. Results Using Mian and Sufi (2022) Shock

IV Negative General Shock: Tighter DTI by Freddie Mac

Unlike the above three credit supply shocks, Johnson (2020) exploits a negative shock to study the effect of mortgage debt-to-income restrictions on house prices. While Fannie Mae and Freddie Mac use broadly similar rules, their criteria sometimes diverge. Johnson (2020) describes how debt-to-income requirements imposed by Freddie Mac became tighter than those of Fannie Mae during 1999, and were not realigned until several years later. The difference in policies can be seen clearly by looking at the debt-to-income distributions of Freddie and Fannie's mortgage purchases. Figure 7, constructed using loans originated in 2000 or 2001, shows a sharp drop in the mass above 50 percent for Freddie but not for Fannie.

When this happens, effective lending standards diverge across locations depending on whether local lenders sell to Fannie or Freddie. Counties where a large share of lenders sold mortgages to Freddie will experience a negative general credit supply shock. To address the concern that some lenders changed GSE relationships in response to the underwriting changes, she measures county exposure to Freddie Mac in

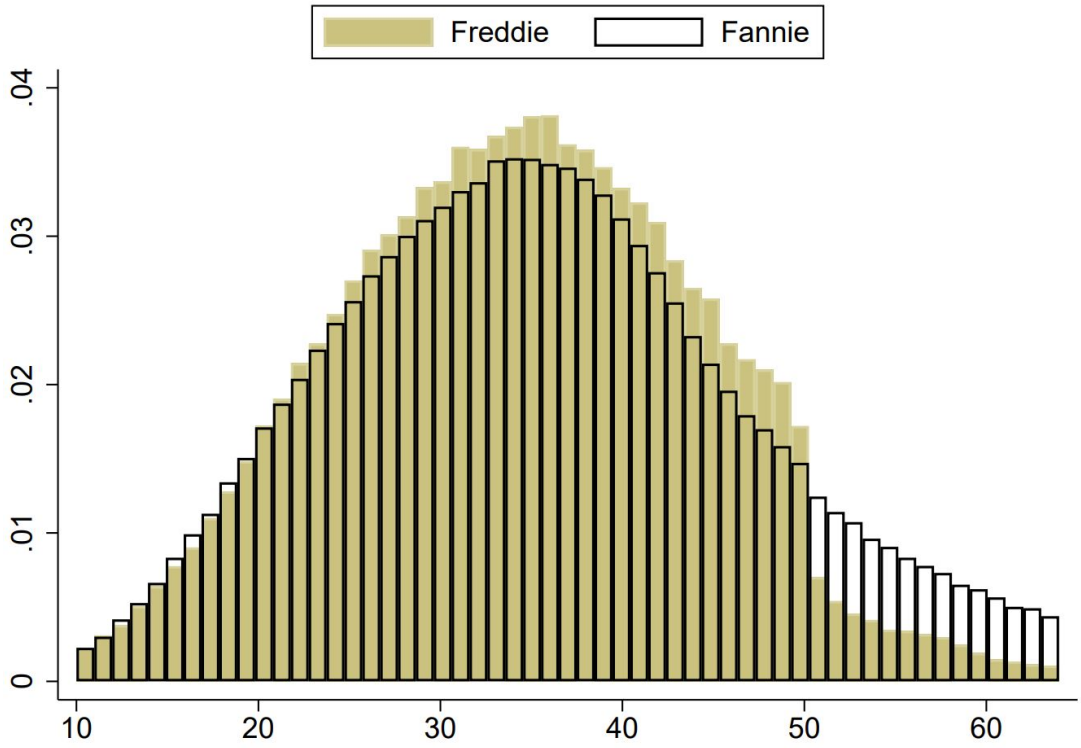

Figure 7. Debt-to-Income Restrictions Imposed by Freddie Mac in 1999

1998 before the policy change occurred. The exposure measure for county c is:

$$\text{Freddie County Share}_{c,1998} = \frac{\text{\# Loans in county c sold to Freddie in 1998}}{\text{\# Loans in county c sold to Freddie or Fannie in 1998}}$$

To use this natural experiment, I estimate the following regression:

$$\log\left(\text{Y}_{c,t}\right) = \lambda_c + \eta_t + \sum_{k \neq 1998} \beta_k \text{Freddie Share}_{c,1998} \mathbf{1}_{(t=k)} + \Gamma X_{c,t} + \varepsilon_{c,t} \tag{4}$$

where c and t index counties and years. $X_{c,t}$ includes population and median household income at the county-year level. λ_c and η_t are county and year fixed effects.

As shown in Figure 8, following a negative general credit supply shock, house prices and loan volumes significantly decrease. Housing liquidity also deteriorates, as measured by days on the market.

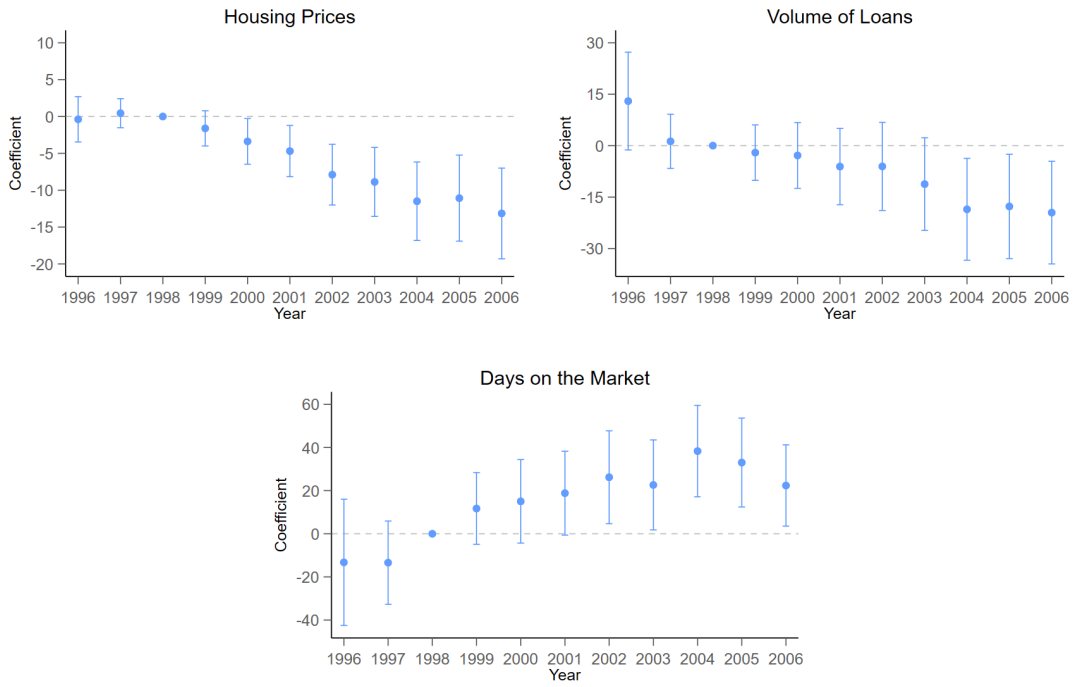

Figure 8. Results Using Johnson (2020) Shock

References

Di Maggio, Marco and Amir Kermani. 2017. "Credit-induced Boom and Bust." *The Review of Financial Studies* 30(11):3711–3758.

Favara, Giovanni and Jean Imbs. 2015. "Credit Supply and the Price of Housing." *American Economic Review* 105(3):958–992.

Johnson, Stephanie. 2020. "Mortgage Leverage and House Prices." *Available at SSRN 3538462* .

Mian, Atif and Amir Sufi. 2022. "Credit Supply and Housing Speculation." *The Review of Financial Studies* 35(2):680–719.

Rice, Tara and Philip E Strahan. 2010. "Does Credit Competition Affect Small-Firm Finance?" *The Journal of Finance* 65(3):861–889.

Saiz, Albert. 2010. "The Geographic Determinants of Housing Supply." *The Quarterly Journal of Economics* 125(3):1253–1296.