

# Borrowing Constraints and Homeownership

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Borrowing constraints enable lenders to manage risk using non-price terms in the presence of imperfect information but also impact the ability of households to become homeowners. Some individual households' welfare would improve if constraints were lifted. However, as the subprime crisis demonstrates, indiscriminately lifting borrowing constraints increases risk in the mortgage market unsustainably and can entail systemic risk.

The literature has identified three constraints that limit access to mortgages: wealth (through maximum loan to value ratio), income (through maximum debt to income ratio) and credit (through minimum credit score). Households with insufficient wealth or income (relative to their preferred housing consumption and local house prices) or an inadequate credit score are unable to become owners even if that would be the optimal tenure based on their preferences,

expected duration of residence, and user cost of owning relative to renting.

Changes in the mortgage market can lead to relaxed borrowing constraints, expanded access to mortgages, and increased homeownership. Whether such credit expansions are sustained depends on the ability of financial markets and regulations to ensure proper risk management and assessment.

The first section reviews evidence of the existence of credit rationing in the US mortgage market. The second section discusses the impact of borrowing constraints on homeownership outcomes post WW II. The third section presents new estimates of the effect of borrowing constraints in the aftermath of the 2008 financial crisis.

## I. Credit Rationing and Homeownership

Stiglitz and Weiss (1981) develop a model of competitive credit markets in which lenders ration access to credit using non-price terms. The impetus for credit rationing in this model comes from asymmetric information, adverse selection, and moral hazard. Likewise, in the mortgage market, the imposition of binding borrowing constraints such as maximum loan to value and debt to income ratios, and credit

score minimums, is a response to the inability of lenders to use risk based pricing to allocate credit. Their ability to risk-based price is limited by the high transaction and information costs associated with estimating credit risk; the presence of unobservable characteristics that affect credit risk; and the effect of higher interest rates on adverse selection and moral hazard.

The empirical literature provides evidence of credit rationing in the mortgage market (Duca and Rosenthal, 1991; Rosenthal et al., 1991). Lenders use non-rate terms to limit adverse selection associated with higher interest rates or moral hazard for borrowers with little collateral. In this context, borrowers who cannot meet a minimum downpayment requirement, for example, will not be able to obtain a mortgage even if they are willing to pay a higher interest rate.

Due to the reliance on access to credit to purchase a home, the mortgage borrowing constraints that arise from credit rationing affects households' tenure choice (and the quantity of housing services they consume). The impact of the borrowing constraints on tenure choice is well-established in the literature. Linneman and Wachter (1989) show

that wealth and income constrained households have a lower propensity to be homeowners.<sup>1</sup>

The literature shows that young and minority households are particularly impacted by borrowing constraints. Haurin et al. (1996) find that young households are more likely to be constrained and that being constrained has a large effect on the propensity of a young household to own. Barakova et al. (2003) look at recent movers under age 50 in 1989, 1995 and 1998 among households comprising the Federal Reserve Board's Survey of Consumer Finances estimate that homeownership would double from about 30 percent to about 60 percent in that population if all constraints were removed. Examining differences across white and minority households, Gyourko et al. (1999) find that minority households are both more likely to be wealth constrained and less likely to be homeowners when constrained. Their results do not indicate significant differences across races in the homeownership rate of unconstrained households.

These studies were conducted in periods with moderate house price appreciation, which would tend to moderate the impact of borrowing constraints. Rapidly increasing house prices contribute to increase the demand for homeownership due to higher expectations

<sup>1</sup> Duca and Rosenthal, 1994 and Rosenthal, 2002 find similar results, as does Haurin et al. with wealth endogenized.

for price appreciation. With rising house prices, constraints become more binding increasing the pressure to relax them; and constraints themselves may become endogenous and pro-cyclical.

## **II. Borrowing Constraints and Homeownership Post WW II**

In the post WW II period we have seen three different mortgage lending regimes characterized by differing borrowing constraint conditions and homeownership outcomes. Borrowing constraints can change as the result of regulatory shifts or financial innovations. The mechanism through which the loosening of constraints occurs has implications for the sustainability of the expansion of credit and homeownership access.

The US experienced a homeownership rate increase of almost 20 percentage points in the 20 years following World War II. As reported by the decennial census, the homeownership rate increased from a low of 44 percent in 1940 to 62 percent in 1960 (U.S. Census, 2015). New government entities in the mortgage market, established in the aftermath of the Great

Depression, specifically FHA and the secondary market institution Fannie Mae, along with the economic expansion that followed WW II contributed to this rise in homeownership. According to Fetter (2013), the self-amortizing long term fixed rate mortgage with lower downpayments that was introduced by FHA was the major factor in this rapid and large increase.

For the subsequent three decades of this post WW II regime, between the 1960s and the 1990s, homeownership remained stable. The conventional self-amortizing 30 year fixed rate “American” mortgage (Green and Wachter 2005) provided housing finance, funded by banks and until the 1980s, by S&Ls, through bank deposits.<sup>2</sup> In the aftermath of the S&L crisis, in the 1980s and the 1990s, this instrument continued to prevail, funded by the secondary market.<sup>3</sup> Despite substantial population growth and increasing inflation over this period, housing remained affordable due to an elastic housing supply.

Starting in the late 1990s, but accelerating during the years 2003 to 2007, a combination of regulatory shifts, new products, and changes

<sup>2</sup> Competition for deposits was limited due to Regulation Q deposit rate ceilings. Similarly deposit taking institutions did not compete for mortgage borrowers on rate.

<sup>3</sup>Securitized mortgages through the GSEs funded the long term fixed rate mortgage after rising inflation

decapitalized the S&Ls. The “housing finance revolution” ended deposit regulation and linked housing finance markets to credit markets (Green and Wachter 2005). The GSEs continued to impose credit constraints for “prime” mortgages that they guaranteed (Levitin and Wachter 2012).

to the structure of the mortgage chain, led to the onset of the second mortgage lending regime, which would prove to be turbulent (Levitin and Wachter 2012). The expansion of credit in the following period was substantial.<sup>4</sup> The number of purchase mortgages originated increased from 4.3 to 5.7 million and remained above 5.5 million through 2006 (FFIEC, 2015).

This increase in debt was not the result of changes in underlying debt repayment capacity of households (such as a positive shock to permanent income) but of changes in credit supply. During the same period, household debt increased faster than income (Mian and Sufi 2015), driven by the increasing volume and market share of nontraditional mortgages (NTM), subprime lending, and second liens.

Gabriel and Rosenthal (2014) show that age specific homeownership rates increased in the early 2000s beyond levels explainable by observables. In the years 2003 to 2007, credit constraints eased relative to historic norms (Barakova et al., 2014). National homeownership rates peaked in 2004, despite the persistent easing of lending constraints, as rising house prices increased the share of households affected by constraints (Barakova et al., 2014).

<sup>4</sup> While there is some evidence of the GSEs expanding credit earlier (Frame et al. 2015), borrowing constraints remained at historical levels until the early 2000s (Rosenthal 2002).

Debates exist as to where credit was directed: to minority and low income households; across the entire income spectrum (Mian and Sufi 2011; 2015; Adelino et al. 2015; Acolin et al. 2015a); or primarily to investors (Haughwout et al. 2011).

As the credit expansion took place, the market share of subprime and non-traditional mortgage products (NTM) increased but neither the risk characteristics of the mortgages issued, nor how the risk was priced, was known (Levitin and Wachter 2012). In the aftermath, we do know that rising price expectations were associated with increased NTM issuance (Brueckner et al. 2012).

As house prices peaked in January 2006 and then rapidly declined, with subprime and NTM issuance going to zero, over a third of US homes with mortgages fell “underwater.” Plummeting collateral values and a weakening economy, combined with the risky characteristics of the loans originated during the boom period, drove delinquency rates to their highest ever recorded levels, above 6 percent for prime and above 25 percent for nonprime.<sup>5</sup> A third regime shift took place in response.

<sup>5</sup> Brueckner et al. (2012) show the importance of “backloading” characteristics, such as, low amortization, in defaults.

### III. The Role of Borrowing Constraints in the Aftermath of the Great Recession

The homeownership rate declined dramatically from a high of 69 percent between 2004 and 2006 to 63.7 percent in the third quarter of 2015, with 8.6 million new renter households and no new homeowner households between the third quarter of 2006 and the third quarter of 2015 (U.S. Census Bureau 2015).<sup>6</sup> In response to high foreclosure rates and “put-backs” to originators of default losses, mortgage originators and secondary market institutions tightened the “credit box.” Evidence on credit availability, based on the characteristics of borrowers, indicate tightening of mortgage underwriting over the period 2008-2013 beyond historic norms (Parrott and Zandi 2013; Goodman et al. 2015). Nonetheless the impact of tightened credit on homeownership has not been estimated.

We estimate the impact of borrowing constraints on homeownership after the Great Recession using the Federal Reserve Survey of Consumer Finance (SCF) for 2010 and 2013 and compare these estimates to those obtained using previous (2001, 2004 and 2007) surveys (Acolin et al. 2015b). The SCF has detailed

information about household wealth and income and variables to impute a credit score based on the model developed in Barakova et al. (2003). In addition, with access to local information about the respondent it is possible to estimate the (unconstrained) preferred house value for a household, given their place of residence, to identify constrained households.

We find that tightened borrowing constraints have a substantial negative impact on the probability of becoming a homeowner in the aftermath of the Great Recession. In the overall population, the estimated marginal decline in the likelihood of being an owner, associated with being subject to one or more of the three borrowing constraints (wealth, income or credit), is 26 percent in 2001 and 23 percent in the period 2004-2007. Following the Great Recession (for the period 2010-2013), the marginal effect of being constrained is a 30 percent decrease in likelihood of owning—substantially larger than in 2001 and 2004-2007 (Table 1).

Table 1: Borrowing Constraints Marginal Effects on Propensity to Own, Entire Population

	2001	2004-2007	2010-2013
Borrowing constraint	-0.26*** (0.07)	-0.23*** (0.06)	-0.30*** (0.04)
Individual and local controls	X	X	X

<sup>6</sup> The decline in homeownership was particularly pronounced among 30-39 year old household heads who experienced a 10.4 percentage point decline between 2004 and 2014 (from 61.9 to 51.5%) compared to a 4.6 percentage point decline in the overall population.

The current homeownership rate would be even lower without the aging of the population. At 2004 age structure, the homeownership in 2014 would be 62.8 percent instead of 64.5 percent (U.S. Census Bureau 2015).

\*\*\* Significant at the 1 percent level.

Based on simulations, we predict homeownership rate in the overall population in 2010-2013 compared to 2004-2007, the loosened credit regime, and to 2001, the historical credit regime. The homeownership rate in 2010-2013 is 5.2 percentage points lower than it would have been if the constraints were at the 2004-2007 level and 2.3 percentage points lower than if the constraints were set at the 2001 level.

Table 2: Predicted Homeownership Rate Based on Different Regime Constraints Coefficients

	2001	2004-2007	2010-2013
Homeownership rate	67.3%	68.9%	66.2%
Predicted homeownership rate: 2001 constraint coefficient		65.2%	68.5%
Predicted homeownership rate: 2004-2007 constraint coefficient			71.4%

### Conclusion

The rationing of credit in the mortgage market due to imperfect information impacts households' propensity to own. In the post-World War II era, institutional shifts and mortgage product innovation increased access to mortgages and homeownership. In the decade 2000 to 2010, changes in the mortgage market led to house price volatility, due to significant easing and then tightening of the credit box to levels beyond historic norms and, ultimately significant declines in homeownership rates.

### REFERENCES

- Acolin, Arthur, Raphael W. Bostic, Xudong An, and Susan M. Wachter. 2015a. *Credit Market Innovations and Sustainable Homeownership: The Case of Non-Traditional Mortgage Products*. Working Paper (2015a).
- Acolin, Arthur, Jesse Bricker, Paul Calem and Susan Wachter. *Borrowing Constraints and Homeownership over the Recent Cycle*. Working Paper (2015b).
- Adelino, Manuel, Antoinette Schoar, and Felipe Severino. *Changes in buyer composition and the expansion of credit during the boom*. No. w20848. National Bureau of Economic Research, (2015).
- Barakova, Irina, Raphael W. Bostic, Paul S. Calem, and Susan M. Wachter. "Does credit quality matter for homeownership?" *Journal of Housing Economics* 12.4 (2003): 318-336.
- Barakova, Irina, Paul S. Calem, and Susan M. Wachter. "Borrowing constraints during the housing bubble." *Journal of Housing Economics* 24 (2014): 4-20.
- Brueckner, Jan, Paul S. Calem, and Leonard I. Nakamura. "Subprime mortgages and the housing bubble." *Journal of Urban Economics* 71.2 (2012): 230-243.
- Calem, Paul, Wachter, Susan M., Courchane, Marsha, 2009. *Sustainable Homeownership*. Wharton Real Estate Center Working Paper.

- Duca, John V., and Stuart S. Rosenthal. "Borrowing constraints and access to owner-occupied housing." *Regional Science and Urban Economics* 24.3 (1994): 301-322.
- Fetter, Daniel K. "How Do Mortgage Subsidies Affect Home Ownership? Evidence From the Mid-Century GI Bills," *American Economic Journal: Economic Policy* 5.2 (2013): 111–147.
- FFIEC. Home Mortgage Disclosure Act Data. (2015) <https://www.ffiec.gov/hmda/>
- Fuster, Andreas, Joseph Tracy, and James Vickery. "The Rescue of Fannie Mae and Freddie Mac." *Journal of Economic Perspectives* 29.2 (2015): 25-52.
- Goodman, Laurie, Jun Zhu, and Taz George. "The Impact of Tight Credit Standards on 2009–13 Lending." Washington, DC: Urban Institute. (2015).
- Green, Richard K., and Susan M. Wachter. "The American mortgage in historical and international context." *Journal of Economic Perspectives* 19.4 (2005): 93-114.
- Gyourko, Joseph, Peter Linneman, and Susan Wachter. "Analyzing the relationships among race, wealth, and home ownership in America." *Journal of Housing Economics* 8.2 (1999): 63-89.
- Haughwout, Andrew, Donghoon Lee, Joseph S. Tracy, and Wilbert Van der Klaauw. "Real estate investors, the leverage cycle, and the housing market crisis." FRB of New York Staff Report 514 (2011).
- Levitin, Adam J., and Susan M. Wachter. "Explaining the housing bubble." *Georgetown Law Journal* 100.4 (2012): 1177-1258.
- Linneman, Peter, and Susan Wachter. "The impacts of borrowing constraints on homeownership." *Real Estate Economics* 17.4 (1989): 389-402.
- Mian, Atif, and Amir Sufi. "House Prices, Home Equity–Based Borrowing, and the US Household Leverage Crisis." *The American Economic Review* 101.5 (2011): 2132-2156.
- Mian, Atif R., and Amir Sufi. *Fraudulent income overstatement on mortgage applications during the credit expansion of 2002 to 2005*. No. w20947. National Bureau of Economic Research, 2015.
- Parrott, Jim, and Mark M. Zandi. "Opening the Credit Box." Washington, DC: Moody's Analytics and Urban Institute. (2013).
- Rosenthal, Stuart S., John V. Duca, and Stuart A. Gabriel. "Credit rationing and the demand for owner-occupied housing." *Journal of Urban Economics* 30.1 (1991): 48-63.
- Rosenthal, Stuart S. "Eliminating credit barriers: how far can we go." *Low-income homeownership* (2002): 111-145.
- Stiglitz, Joseph E., and Andrew Weiss. "Credit rationing in markets with imperfect

information." *The American economic review* (1981): 393-410.

U.S. Census Bureau. 2015a. "Housing Vacancies and Homeownership: CPS/HVS Historical Tables."  
<http://www.census.gov/housing/hvs/data/histtabs.html>