Credit Supply and Housing Prices in National and Local Markets

Susan Wachter*

The Wharton School, University of Pennsylvania

* *Corresponding Author:* Real Estate Department, The Wharton School, University of Pennsylvania, 430 Vance Hall, 3733 Spruce Street, Philadelphia, PA 19104, Email: wachter@wharton.upenn.edu, Telephone: (215) 898-6355.
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ABSTRACT

The phenomenon of "irrational exuberance" around housing prices is now well established as a driving force of housing bubbles. However, the roles of credit supply and the mispricing of credit are less well understood. This article discusses the recent literature on the relationship between credit supply and housing prices in national and local markets, with a view to identifying gaps in understanding this relationship as well as the implications of these gaps for the ability of market participants and regulators to detect systemic risk. This article also connects the literature to this special issue, which emphasizes the importance of understanding local market conditions, including ways in which housing finance affects and is in turn affected by local markets.

Key words: Real estate economics; Housing economics; Systemic risk

1. INTRODUCTION

At the time of the Panic of 2007, few economists were predicting follow-on effects for the national economy.[1] In the U.S. in 2007, neither federal regulators nor private sector analysts identified the increase in systemic risk through the exposure of the financial system to the housing bubble. Many sophisticated investors and Wall Street institutions were more heavily tilted toward risky real estate investments than they had been in previous years.[2] Even as housing prices began their decline, most economists were predicting no severe economic consequences. Some economists, particularly those at the Federal Reserve System, did identify the "fact" that housing prices were out of line with fundamentals.[3] Also, Shiller (2000) famously pointed to the role of "irrational exuberance" in driving asset bubbles. The implications for credit markets, however, and the vulnerability of the financial system to a panic and the consequences for the overall economy were only realized over time.[4] The problem of irrational exuberance around housing prices is now well established as a driving force of housing bubbles.[5]

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[1] With the implosion of firms providing subprime credit, this market shut off in 2007, leading to distress throughout the financial system. See Gorton (2009) and St. Louis Federal Reserve Bank (2014). Federal Reserve policy makers met in August 2007, and according to a transcript of that meeting, Federal Reserve officials did not believe that housing foreclosures would cause a broader economic crisis. As Wilcox states in the transcript (page 19), forecasted real GDP growth for the next year and a half was reduced by ¼ percentage point. Even the Fed's most extreme scenario did not generate a recession. See the 7 August 2007 transcript, available at: http://www.federalreserve.gov/monetarypolicy/files/FOMC20070807meeting.pdf. In September discussion of the longer term outlook predicted some slowing but no long term negative outcomes: "With credit markets expected to largely recover over coming quarters, growth of real GDP was projected to firm in 2009 to a pace a bit above the rate of growth of its potential." See Minutes of the Federal Open Market Committee of September 18, 2007.

[2] Foote, Gerardi, and Willen (2011) and Foote, Gerardi, and Willen (2012) discuss the failure of experts to identify increased risk.

[3] Housing prices were recognized as being due for a fall by Fed economists by 2005. See Reddy (2011) and the following discussion.

[4] Some economists, however, did believe that a recession was likely (Roubini 2007). Given the lack of Fed awareness of the danger, this author commented in August 2007, "I made the following comment: "I came to Jackson Hole thinking there would be no recession, but I'm leaving thinking we could well have one" – reported in Fraher and Lanman (2007).

[5] See Shiller (2000) and Case, Quigley and Shiller (2011).

However, the role of credit supply as an accelerator of housing bubbles was then and is now less well understood.[6]

Economists' lack of focus on the build-up of housing debt can be partially attributed to the fact that, in the canonical literature, credit and interest rate factors do not enter house price models with significance. This is despite the obvious importance of credit for housing markets.[7] In the aftermath of the mortgage crisis, there has been far more attention to the relationship between credit supply and housing prices by financial and real estate economists. The inclusion of mortgage credit factors in pricing models is, however, still not standard. There are basic questions on the relationship between credit supply and housing prices, which are under-researched. This article points to the gaps in our understanding of these complex interrelationships as well as the implications of these gaps for the ability of market participants and regulators to detect systemic risk. This article also connects the literature to this special issue, all of which focus on local markets and discuss how finance affects and is in turn affected by local markets.

The remainder of this article is organized as follows. Section 2 reviews the literature on national credit supply and housing prices. Section 3 assesses regional house price models and the importance and difficulties of including credit factors. Section 4 concludes with a discussion of the role of diversification in the need for credit supply information.

[6] Some were aware of the overextension of credit during the bubble years and the potential fall-out for housing prices. A number of market participants made speculative bets on a decline of housing values, see Zuckerman (2008). However, the role of the supply of credit and its pricing received relatively less attention, even though the seizing up of credit markets arguably was the immediate cause of the financial panic and the precipitant of the subsequent severe decline of housing prices.

[7] If such models include a credit factor, the variable included is the interest rate on the 10-year Treasury bond, rather than a measure of mortgage credit supply and pricing. Regional data on credit supply and mortgage terms, including pricing, are lacking, as discussed further below.

2. CREDIT AND NATIONAL HOUSING PRICES: RELATED LITERATURE

Housing is deeply embedded in and influenced by credit markets, as credit is required for most home purchases. The ability to borrow for new home purchases and to refinance at lower interest rates and at more favorable terms played a role in incentivizing and enabling the historic and rapid expansion in mortgage debt in the immediate years prior to the financial panic of 2007. Taking a longer perspective, prior to the crisis, mortgage rates declined and borrowing increased as share of GNP, over a period of several decades. This increase was used to fund greater home ownership and was also a source of credit that enabled median household consumption to increase more than otherwise possible, given the stagnation of real wages in the U.S.[8] The long-term secular decline in interest rates occurred on rates for all loan types including mortgages whose rates were also considerably lower than for consumer credit.[9]

It is, of course, now well known that the decline in mortgage interest rates was accompanied by a secular rise in inflation adjusted housing prices that began at the end of the 1990s and ratcheted up in the mid-2000s. Empirical studies, however, commonly find little evidence for a significant impact of borrowing costs, as measured by interest rates and mortgage costs, on housing prices. For instance, Glaeser, Gottlieb and Gyourko (2010) find that, although the inflation-adjusted yield on 10-year Treasury notes fell 120 basis points from 1996 to 2006, this decline cannot explain more than one-fifth of the rise in prices over this period of the greatest house price expansion in the history of the U.S. Conversely, other economic

[8] See Mian and Sufi (2014) for a discussion of this long term shift towards mortgage debt.
[9] The result was "credit consolidation" and a significant shift to debt collateralized by housing assets. See Wachter, Warren and Bachieva (2005) for a discussion of the role of debt consolidation. They document rising mortgage debt levels from 27 percent of disposable income in 1979 to 73 percent in 2001, causing an overall increase in outstanding household debt from 36 percent in 1979 to 109 percent in 2001. They show that this increase comes from higher loan-to-value ratios at origination as well as the substitution of mortgage debt for consumer debt by consolidating credit card debt and consumer loans into mortgage debt through refinancing.

fundamentals such as income, GDP, or population growth are generally found to have a larger impact on housing prices. As in the previous literature,[10] interest rates are not cited as a major factor in house price evolution either in the bubble years or earlier. This is despite the conceptual importance of interest rates as a driver of the price-to-rent ratio for housing as for other financial assets.

The more recent literature focusing on the supply of mortgage credit, rather than the interest rate, does commonly find measures of credit supply to be significantly associated with house prices. For the bubble years, Levitin, Pavlov and Wachter (2012) study the evolution of credit and house prices on a national scale and show the link between the aggregate volume of credit and the national price-to-rent ratio. They find that the national price-to-rent ratio grows steadily during the bubble years, peaking in 2006, with a sharp decline thereafter, with the evolution closely aligned with the growth in lending volume, rather than, for example, the growth in income. However, this correlation of lending volume and the price-to-rent ratio is insufficient evidence to infer a causal link between these two measures.

There is a growing body of literature that focuses on the nature and direction of causality in the relationship between the volume of mortgage debt and house prices. For example, Berlinghieri (2012) and Anundsen and Jansen (2013) employ structural vector error correction models to identify whether mortgage expansion Granger-causes price rises or whether rising prices Granger-cause an expansion in mortgage credit. These studies generally support bidirectional causality. When interest rates and credit supply are jointly included, credit supply is found to be significant in the evolution of house prices, while interest rates are not. Jurgilas and

[10] See Himmelberg, Meyer and Sinai for an example and discussion. Interest rates as measured by the 10-year Treasury were increasing in the 2003-2006 bubble years, thus their evolution could not cause or contribute to price rises. However, Levitin and Wachter (2012) show that returns on mortgage-backed securities in this period were decreasing.

Lansing (2013) test for the impact of interest rates and the mortgage supply on housing prices in Norway from 1986 to 2008, using a structural vector error correction model, with simulations used to quantify the effects of exogenous shocks on house prices and credit. They find a feedback loop between house prices and credit expansion but that interest rates indirectly and weakly influence house prices.

Mortgage supply both impacts and is impacted by housing prices, preventing its use as an identifier of a potential housing bubble. The evidence of bidirectional causality implies that housing bubbles cannot be identified relying solely on information about mortgage debt, without identifying the underlying factors that drive both. I argue elsewhere in this article that the missing factor behind the increase in mortgage debt and housing prices is the decreasing cost and increasing availability of mortgage credit, in the face of increasing risk. When the mispricing of mortgage debt becomes apparent, the result is illiquidity and subsequently, a solvency crisis.

The correlation of mortgage debt and house prices does not in itself constitute a sign of danger. In the U.S., as elsewhere, an increase in mortgage debt may partly be attributed to "financial innovation" that overcomes barriers to lending and decreases risk through enabling income smoothing.[11] Two unidentified factors, if known, could have made the crisis easier to predict. The first of these is the price of mortgage debt for a given loan quality; that is, the mortgage interest rate conditional upon the embedded risk. The second is the aggregate shift in quality of underwriting and the credit composition of the overall book of business. To deter a systemic crisis of course requires foreknowledge of the danger as systemic risk develops. Crucial to this is knowledge of the price of mortgage debt conditional upon the embedded risk

[11] See Favilukis et al. (2012) for a description of a model in which financial innovations through financial market liberalization and technological gains allow households to smooth their consumption by reducing the risk in the economy and the risk of investments, enabling higher asset prices. See Levitin and Wachter (2013) for a discussion.

and the credit quality of the overall book of business and the relationship of these to housing prices.[12]

3. THE LIMITATIONS OF MODELING REGIONAL HOUSE PRICES IN IDENTIFYING NATIONAL BUBBLES

The aftermath of the mortgage crisis has seen attention focus on the relationship between credit supply, interest rates, and housing prices. However, the inclusion of such factors in pricing models is not standard. Housing price models are regionally based and focus on fundamental factors of physical supply and demand rather than credit factors. In addition, regional data on mortgage availability, terms, and pricing, for a given quality of credit, are not readily available.

Most empirical models predict regional house prices using data on Metropolitan Statistical Areas (MSAs); see for instance Leamer (2003), Follain and Sklarz (2005), Goodman and Thibodeau (2008), Anundsen and Heeboll-Christensen (2013), and Follain and Giertz (2014).[13] These models generally use a deviation of the value-to-rent ratio or user cost from the average to detect disequilibrium. During the boom period, these models consistently suggested positive errors for regional markets across the U.S., suggesting an omitted variable bias from a national factor in the evolution of house prices. In the years 2003 to 2006, the error terms are particularly large and suggest that the fundamentals included in these models fail to capture the

[12] See footnote 17 below for further discussion. Evidence on the increasing availability of credit in these years is found in Davidson, Levin and Wachter (2014) and Barakova et al. (2013). The latter, tests for an increase in the availability of credit between 2003 and 2007, and finds that traditional constraints (both credit quality and income based) to homeownership declined substantially. This is consistent with the explosive expansion in these years of subprime mortgages which did not require credit qualification and alt-A mortgages which did not require income qualification.

[14] Anundsen and Heeboll-Christensen (2013) also focus on local differences in supply elasticity. Using data from the bubble years for MSAs, they find that prices rose more in the short run in inelastic markets but not in the long run. Local market characteristics such as supply elasticity as well as the supply of credit matter for regional differences in price dynamics. In particular, the rapidity of the historically unprecedented increase in prices in affected markets may have been due to a regime shift in supply elasticity as well as in availability of credit.

high empirical market prices for most MSAs. Himmelberg, Mayer, and Sinai (2005) examine to what extent prices are related to fundamentals based on MSA-level user costs, which include interest rates on the 10-year Treasury. They find that prices appear justified through 2004. However, their model fails to predict the acceleration in price appreciation after 2004

Most empirical studies to date do not include a measure of local credit conditions in their estimations. While there are only slight variations in metropolitan mortgage interest rates using prime lending rates, there are significant differences across regional markets in the sources of the supply of credit. Measures of local credit conditions are excluded from these models due to limited data availability. Follain and Sklarz (2005) explore and speculate on the effect of regional credit markets and on the way that this omitted variable may explain error terms.[14]

In the aftermath of the financial crisis several studies test for the potential role of credit supply in housing price evolution during the bubble and the subsequent crash by including regional credit factors. Pavlov and Wachter (2011) use instrumental variables to identify the expansion of subprime lending and link house price acceleration to the expansion of credit supply in the bubble years. Adelino et al. (2011) also find that higher credit supply induces increasing house prices. Similarly to the national studies discussed above, other studies based on regional data, show evidence of regional feedback loops between house price expectations and mortgage supply (Brueckner et al. 2012). Conversely, Coleman et al. (2008) find the increased credit supply during the period 2003-2007 to be a result of the rise in house prices. Using the volume of subprime lending in 2004-2005, Follain (2012) predicts sharp price declines in areas with large volumes of subprime lending.

[14] Follain and Sklarz (2005) use house price forecasts at the MSA level to feed a model of default and prepayment in order to generate estimates of future default losses.

The incorporation of regional variations in the price of credit relative to risk shows a two-way interrelationship between the availability of credit and house prices. The recent literature shows that easier credit on a regional scale is related to higher housing prices, all else equal, and that the relationship of the relative cost of credit to house price appreciation across economies is, in the cross-section, predictive of the extent of price declines after real estate bubbles peak (Pavlov and Wachter 2009). Nonetheless, data on the regional availability and pricing of mortgage credit were not and are not available real-time on a regional level.[15] Thus, these indicators could not have been and cannot be incorporated into the regional house price models that were and are widely used to identify the extent to which house prices are based on fundamentals.

4. MARKET DIVERSIFICATION AND THE NEED FOR CREDIT SUPPLY INFORMATION

Based in part on the inability of house price models to explain price hikes, some market observers warned that a bubble might be forming, but few understood just how catastrophic it would be when the bubble popped. For example, the meeting minutes of the Federal Reserve's Open Market Committee from 2005 and 2006 show that the Fed's economists believed that prices were above long-term fundamentals by 20 percent, yet they did not expect a recession. Rather, the prevailing belief was that any price decline would be "contained," and that prices would return to their normal relationship to rents, through rent growth rather than price declines. Data on the deterioration of lending standards, the extent to which risky mortgages had

[15] As discussed above, the limited general data that were available underestimated the declines that actually occurred (Follain and Giertz 2014).

accumulated in the financial system, the pricing of risky credit, and the extent of financial institutions' exposure to the risk of price declines were neither monitored nor collected.

The Fed was not alone. "As regulators, we just have to trust that rating agencies are going to monitor CDOs," said Kevin Fry, chairman of the Invested Asset Working Group of the U.S. National Association of Insurance Commissioners, in 2007. "We can't get there. We don't have the resources to get our arms around it." The U.S. Office of the Comptroller of the Currency agreed. "We rely on the rating agencies to provide a rating," said Kathryn Dick, the deputy comptroller for credit and market risk (Tomlinson and Evans 2007).

A conceptual reason for the lack of tracking of national mortgage debt data was the understanding that default risk was local and could be diversified away. For example, the packagers of CDOs were required to diversify by accumulating securities across investment banks. The reliance on diversification missed the critical risk from correlation. If local markets were all exposed to the national underpricing of mortgage risk, diversification implies that all securities represent a put option on the national housing market. In fact, diversification meant that mortgage securities were going to decline in value at the same time, triggering a simultaneous rush to the exits. Differences in mortgage securities' exposure to risk was not known.

The lack of transparency not only shrouded risk, but it also magnified the ensuing panic as it generated a lack of trust. Without knowledge of which financial intermediaries were holding the most risky assets, all were in question, causing credit to seize and the market to freeze. What mattered was the implication of the national underpricing of credit risk for the viability of the banking system as a whole.

The Dodd-Frank Act has attempted to mitigate this accumulation of systemic risk by requiring originators to retain 5 percent of the default risk on any mortgage that does not qualify as a "qualified residential mortgage". However, this provision does not address the need to track the characteristics of that debt. What made this bubble different from, and so much worse than, previous cycles in the U.S. was the role of the expansion in mortgage debt in the evolution of housing prices, or the increase in housing prices that was due to the increased availability of mortgage debt. Regulators, originators, insurers, and "rate investors" unconcerned about credit risk arguably had little knowledge of the correlation risk between the real estate assets that were being traded. Existing knowledge of regulated institutions' direct exposure to their own lending risk is insufficient. The lesson of this crisis is that mortgage credit supply, from all sources, affects house price risk.

In short, while the expansion of credit was known, the quality and market mis-pricing of that credit were not known. Many economists were questioning whether housing price increases were entirely justified by fundamentals. However, it seemed that financial intermediaries had diversified away much of the risk involved in real estate investments, creating a false sense of security when it turned out that financial intermediaries[16] had substantially increased the overall risk of the system by leveraging assets with high correlations. This correlation risk was the one risk that market participants, including regulators, took for granted as under control. At the same time, this correlation risk is the reason that the decline of the housing market spread so quickly throughout the banking system, making the Great Recession more severe than any other since the

[16] Herring and Wachter (2000, 2003) show that financial intermediaries propagate housing bubbles by relying on appraisals based on market prices in their lending decisions. Moreover, they also show that financial intermediaries further propagate housing price booms by lowering lending standards due to a perception of decreasing risk as prices rise. An instrument to short sell real estate when prices depart from fundamentals and aggregate information on credit quality to inform that trading, could help complete the market and mitigate bubbles, as discussed in Pavlov and Wachter (2009) and Levitin, Pavlov, and Wachter (2012).

Great Depression. Understanding this risk and, more generally, the market dynamics of house prices for regions and the nation are an unfinished project.

REFERENCES

Akerlof, George A., and Robert J. Shiller. 2009. *Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism.* Princeton, NJ: Princeton University Press.

Anundsen, André K and Christian Heebøll-Christensen. 2013. "Supply restrictions, subprime lending and regional US housing prices." Memorandum, 04, Department of Economics, University of Oslo: Oslo, Norway.

Anundsen, André K. and Eilev S. Jansen. Forthcoming. "Self-reinforcing effects between housing prices and credit." *Journal of Housing Economics*.

Barakova, Irina, Paul Calem and Susan M. Wachter. 2014. "Borrowing Constraints during the Housing Bubble." *Journal of Housing Economics*, 24 June 2014: 4-20.

Berlinghieri, Laura. 2012. "Essays on House Price Fluctuations in the U.S." Ph.D. thesis. University of Washington: Seattle, WA.

Brueckner, Jan K., Paul Calem, and Leonard I. Nakamura. 2012. "Subprime mortgages and the housing bubble." *Journal of Urban Economics*, 17 (2): 230-243.

Coleman, Major, Michael LaCour-Little and Kerry D. Vandell. 2008. "Subprime lending and the housing bubble: Tail wags dog?" *Journal of Housing Economics,* 17: 272–290.

Davidson, Adam, Alex Levin, and Susan Wachter. 2014. "Mortgage Default Option Mispricing and Procyclicality." *Homeownership Built to Last: Balancing Access, Affordability, and Risk after the Housing Crisis*. Eric S. Belsky, Christopher E. Herbert, and Jennifer H. Molinsky, eds. Brookings Institution and the Harvard University Joint Center for Housing Studies, Cambridge, MA: 290-316.

Favilukis, Jack, Sydney Ludvigson, and Stijn Van Nieuwerburgh. 2012. "The Macroeconomic Effects of Housing Wealth, Housing Finance, and Limited Risk-Sharing in General Equilibrium." New York University Working Paper, New York, NY.

Follain, James R. and Mike Sklarz. 2005. "Pricing of market specific bubbles." *Mortgage Banking,* October, 2005: 158.

Follain, James R. 2012. "A Search for the Underlying Structure Driving House Prices in a Distressed Environment." Lincoln Institute of Land Policy Working Paper. Available at: http://www.lincolninst.edu/pubs/2158_A-Search-for-the-Underlying-Structure-Driving-House-Prices-in-a-Distressed-Environment

Follain, James R. and Seth H. Giertz. 2014. "US House Price Bubbles and Busts Implications for Property Taxation." *Public Finance Review.*

Foote, Christopher L., Kristopher S. Gerardi, and Paul S. Willen. 2011. "Reasonable People Did Disagree: Optimism and Pessimism about the U.S. Housing Market Before the Crash." In *The American Mortgage System Crisis and Reform*, Susan M. Wachter and Marvin M. Smith, eds. Philadelphia, PA: University of Pennsylvania Press: 26-59.

Foote, Christopher L., Kristopher S. Gerardi, and Paul S. Willen. 2012. "Why Did So Many People Make So Many Ex Post Bad Decisions? The Causes of the Foreclosure Crisis." Federal Reserve Bank of Boston Working Paper, Boston, MA.

Fraher, John and Scott Lanman. 2007. "Bernanke's Pledge Fails to Dispel Pessimism at Jackson Retreat." *Bloomberg News* (3 September 2007), available at http://www.bloomberg.com/apps/news?pid=newsarchive&sid=ac5M2fUfn77U.

Glaeser, Edward L., Joshua D. Gottlieb, and Joseph Gyourko. 2010. "Can Cheap Credit Explain the Housing Boom?" National Bureau of Economic Research Working Paper Cambridge, MA.

Goodman, Allen C. & Thibodeau, Thomas G. 2008. "Where are the speculative bubbles in US housing markets?" *Journal of Housing Economics*, 17(2): 117-137.

Gorton, Gary. 2009. "Information, Liquidity, and the (Ongoing) Panic of 2007." *The American Economic Review*, 99 (2): 567-72.

Himmelberg, Charles, Christopher Mayer, and Todd Sinai. 2005. "Assessing High House Prices: Bubbles, Fundamentals, and Misperceptions." *Journal of Economic Perspectives*, 19 (4): 67-72.

Jurgilas, Marius and Kevin J. Lansing. 2013. "Housing Bubbles and Expected Returns to Homeownership: Lessons and Policy Implications." In *Property Prices and Real Estate Financing in a Turbulent World*. Morten Balling and Jesper Berg, eds. SUERF, The European Money and Finance Forum: 101-123.

Leamer, Edward E. 2003. "Bubble Trouble? Your Home Has a P/E Ratio Too." *UCLA Anderson Forecast.* Los Angeles: University of California, Los Angeles

Levitin, Adam J. and Susan M. Wachter. 2011. "Information Failure and the U.S. Mortgage Crisis." *The American Mortgage System: Crisis and Reform*. Susan M. Wachter and Marvin M. Smith, eds. Philadelphia, PA: University of Pennsylvania Press: 243-270

Levitin, Adam J. and Susan M. Wachter. 2012. "Explaining the Housing Bubble*." Georgetown Law Journal*, 100 (4): 1177-1258.

Levitin, Adam J. and Susan M. Wachter. 2013. "Why Housing?" *Housing Policy Debate*, 23: 5-27.

Levitin, Adam J., Andrey D. Pavlov and Susan M. Wachter. 2012. "The Dodd-Frank Act and Housing Finance: Can It Restore Private Risk Capital to the Securitization Market?" *Yale Journal on Regulation*, 29 (1): 155-180.

Mian, Atif and Amir Sufi. 2014. *House of Debt: How They (and You) Caused the Great Recession, and How We Can Prevent It from Happening Again.* Chicago, IL: The University of Chicago Press.

Pavlov, Andrey D. and Susan M. Wachter. 2009. "Mortgage Put Options and Real Estate Market." *The Journal of Real Estate Finance and Economics*, 38(1): 89-103.

Pavlov, Andrey D. and Susan M. Wachter. 2009. "Systemic Risk and Market Institutions." *Yale Journal on Regulations*, 26(1): 445-455.

Pavlov, Andrey and Susan M. Wachter. 2011. "Subprime Lending and Real Estate Prices." *Real Estate Economics*, 39(1):1–17.

Pavlov, Andrey D., Susan M. Wachter and Albert A Zevelev. 2014. "Transparency in the Mortgage Market." *Journal of Financial Services Research*, forthcoming. Available at SSRN: http://ssrn.com/abstract=2439716.

Reddy, Sudeep. 2011. "Fed Felt Hamstrung By 2005 Housing Bubble." *The Wall Street Journal*, (January, 15 2011). Page A4.

Roubini, Nouriel. 2007. "The Risk of a U.S. Hard Landing and Implications for the Global Economy and Financial Markets." Transcript of IMF Seminar. International Monetary Fund: Washinton, DC. (September 13, 2007). Retrieved from http://www.imf.org/external/np/tr/2007/tr070913.htm

Shiller, Robert J. 2000. *Irrational Exuberance*. New York, NY: Crown Business.

St. Louis Federal Reserve Bank. 2014. "The Financial Crisis: A Timeline of Events and Policy Actions." Available at: http://timeline.stlouisfed.org/pdf/CrisisTimeline.pdf

Tomlinson, Richard and David Evans. 2007. CDO Boom Masks Subprime Losses, Abetted by S&P, Moody's, Fitch. *Bloomberg Markets Magazine*, (May 30, 2007).

Wachter, S., Elizabeth Warren, and Raisa Bachieva. 2005. "Mortgage debt, bankruptcy, and the sustainability of homeownership." In *Credit markets for the poor*, H. Rosenthal, ed. New York, NY: Russell Sage Foundation. pp 73-112

Zuckerman, Gregory. 2008. "Trader Made Billions on Subprime." *The Wall Street Journal*, (Jan. 15, 2008). Page A1, A10.